

Docket No., 218290US2



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Kouichi OHTAKA, et al.

SERIAL NO: 10/050,865

GAU: 2872

FILED: January 18, 2002

EXAMINER:

FOR: OPTICAL MODULATOR, OPTICAL MODULATOR MANUFACTURING METHOD, LIGHT INFORMATION PROCESSING APPARATUS INCLUDING OPTICAL MODULATOR, IMAGE FORMATION APPARATUS INCLUDING OPTICAL MODULATOR, AND IMAGE PROJECTION AND DISPLAY APPARATUS INCLUDING OPTICAL MODULATOR

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- ☐ The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- ☐ A check is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- ☒ Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the claims and drawings of the pending applications are attached.
- ☐ A check is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

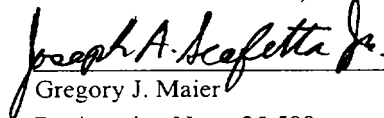
- ☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- ☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- ☒ Please charge any additional fees for the papers being filed herewith and for which no check is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
218290US2*	10/050,865	01/18/02	OHTAKA et al.
232796US2	10/394,025	03/24/03	SAKAI et al.

*Present Application; listed for information
GJM/sb

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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/ Applicant</u>
218290US2*	10/050,865	01/18/02	OHTAKA et al.
232793US2	10/385,535	03/12/03	MIYAGUCHI et al.

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*Present Application; listed for information

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5 WHAT IS CLAIMED IS:

1. A developing device, comprising:

a transporting member arranged opposite to a latent image supporter and configured to develop a latent image on the latent image supporter with a powder while moving the powder;

10 said transporting member comprising

a plurality of electrodes configured to generate a traveling-wave electric field to move the powder,

wherein n-phase voltages are applied to the plurality of electrodes of the transporting member to form an electric field such that the powder moves towards the latent image supporter at an image portion of the latent image and the powder moves in a direction
15 opposite to the latent image supporter at a non-image portion of the latent image.

2. The developing device of claim 1, wherein an average potential of the n-phase voltages applied to the plurality of electrodes of the transporting member is set to a potential between a potential of the image portion of the latent image and a potential of
20 the non-image portion of the latent image.

3. The developing device of claim 1, wherein the n-phase voltages applied to the electrodes of the transporting member have a waveform such that a pulse voltage and a DC bias voltage are overlapped.

4. The developing device of claim 3, further comprising:
25 means for outputting the DC bias voltage, wherein the means is able to vary the DC bias voltage.

5. The developing device of claim 1, wherein the n-phase voltages applied to the plurality of electrodes of the transporting member are pulse-shaped waveforms.

5 6. The developing device of claim 1, wherein the n-phase voltages applied to the plurality of electrodes of the transporting member have a pulse-shaped waveform, and wherein a potential of the pulse-shaped waveform that causes the powder to repulsively fly is a potential between a potential of the image portion of the latent image and a potential of the non-image portion of the latent image.

10 7. A developing device, which develops a latent image on a latent image supporter with a powder while moving the powder, comprising:

 a means for generating an electric field in a direction so that the powder moves in a direction opposite to the latent image supporter at a region after a developing region.

 8. A developing device, which develops a latent image on a latent image supporter
15 with a powder while moving the powder, comprising:

 a means for generating a first electric field such that the powder at an image portion of the latent image moves towards the latent image supporter and the powder at a non-image portion of the latent image move in a direction opposite to the latent image supporter, and for generating a second electric field such that the powder present at a
20 region after a developing region moves in a direction opposite to the latent image supporter.

 9. The developing device of claim 7, wherein a strength of the electric field formed at the region after the developing region is set within a range so that the powder adhered on the latent image supporter is not separated from a surface of the latent image supporter.

25 10. The developing device of claim 8, wherein a strength of the electric field formed at the region after the developing region is set within a range so that the powder adhered on the latent image supporter is not separated from a surface of the latent image supporter.

 11. The developing device of claim 7, wherein the means for generating an electric

5 field comprises a transporting member, wherein the transporting member comprises a plurality of electrodes for generating a traveling-wave electric field to transport the powder, and wherein n-phase voltages are applied to each of the plurality of electrodes of the transporting member.

12. The developing device of claim 8, wherein the means for generating an electric
10 field comprises a transporting member, wherein the transporting member comprises a plurality of electrodes for generating a traveling-wave electric field to transport the powder, and wherein n-phase voltages are applied to each of the plurality of electrodes of the transporting member.

13. The developing device of claims 11, wherein the n-phase voltages are applied to
15 the transfer member such that in the developing region an electric field in a direction where the powder moves towards the latent image supporter is formed at the image portion of the latent image but moves in a direction opposite to the latent image supporter at the non-image portion of the latent image, and an electric field in a direction where the powder moves in a direction opposite to the latent image supporter is formed in the region
20 after the developing region.

14. The developing device of claims 12, wherein the n-phase voltages are applied to the transfer member such that in the developing region an electric field in a direction where the powder moves towards the latent image supporter is formed at the image portion of the latent image but moves in a direction opposite to the latent image supporter
25 at the non-image portion of the latent image, and an electric field in a direction where the powder moves in a direction opposite to the latent image supporter is formed in the region after the developing region.

15. The developing device of claim 11, wherein at the developing region, an average

5 potential of the n-phase voltages applied to the transporting member is set to a potential between a potential of the image portion of the latent image and a potential of the non-image portion of the latent image, and wherein at the region after the developing region, an average potential of the n-phase voltages applied to the transporting member is set to a potential higher than the potentials of the image portion and the non-image portion.

10 16. The developing device of claim 12, wherein at the developing region, an average potential of the n-phase voltages applied to the transporting member is set to a potential between a potential of the image portion of the latent image and a potential of the non-image portion of the latent image, and wherein at the region after the developing region, an average potential of the n-phase voltages applied to the transporting member is set to a
15 potential higher than the potentials of the image portion and the non-image portion.

17. The developing device of claim 11, wherein at the developing region, an average potential of the n-phase voltages applied to the transporting member is set to a potential between a potential of the image portion of the latent image and a potential of the non-image portion of the latent image, and wherein at the region after the developing region,
20 an average potential of the n-phase voltages applied to the transporting member is set to a potential lower than the potentials of the image portion and the non-image portion.

18. The developing device of claim 12, wherein at the developing region, an average potential of the n-phase voltages applied to the transporting member is set to a potential between a potential of the image portion of the latent image and a potential of the non-image portion of the latent image, and wherein at the region after the developing region,
25 an average potential of the n-phase voltages applied to the transporting member is set to a potential lower than the potentials of the image portion and the non-image portion.

19. The developing device of claim 11, wherein different bias voltages are further

5 applied to the transporting member depending on a gap between the latent image supporter and the transporting member.

20. The developing device of claim 12, wherein different bias voltages are further applied to the transporting member depending on a gap between the latent image supporter and the transporting member.

10 21. The developing device of claim 11, wherein the n-phase voltages applied to the transporting member are changed depending on a gap between the latent image supporter and the transporting member.

22. The developing device of claim 12, wherein the n-phase voltages applied to the transporting member are changed depending on a gap between the latent image supporter
15 and the transporting member.

23. The developing device of claim 11, wherein a gap between the latent image supporter and the transporting member at the developing region is substantially the same as a gap between the latent image supporter and the transporting member at the region after the developing region.

20 24. The developing device of claim 12, wherein a gap between the latent image supporter and the transporting member at the developing region is substantially the same as a gap between the latent image supporter and the transporting member at the region after the developing region.

25 25. The developing device of claim 23, wherein the transporting member comprises a bent portion.

26. The developing device of claim 24, wherein the transporting member comprises a bent portion.

27. The developing device of claim 25, wherein the bent portion of the transporting

5 member is formed at the region after the developing region.

28. The developing device of claim 26, wherein the bent portion of the transporting member is formed at the region after the developing region.

29. The developing device of claim 27, wherein the gap between the latent image supporter and the portion of the transporting member at the region after the developing
10 region is getting wider in a direction opposite to the developing region.

30. The developing device of claim 28, wherein the gap between the latent image supporter and the portion of the transporting member at the region after the developing region is getting wider in a direction opposite to the developing region.

31. The developing device of claim 11, wherein the voltages applied to the
15 electrodes are from 0V to $-V_1$ at the developing region, and from 0V to $+V_2$ at the region after the developing region.

32. The developing device of claim 12, wherein the voltages applied to the electrodes are from 0V to $-V_1$ at the developing region, and from 0V to $+V_2$ at the region after the developing region.

20 33. The developing device of claim 11, wherein the voltage applied to the electrodes are from 0V to $+V_3$, and from 0V to $-V_4$ at the region after the developing region.

34. The developing device of claim 12, wherein the voltage applied to the electrodes are from 0V to $+V_3$, and from 0V to $-V_4$ at the region after the developing region.

35. The developing device of claim 31, further comprising a circuit for generating
25 the n-phase applied to the electrode of the transporting member, wherein the circuit comprises a clamper circuit.

36. The developing device of claim 32, further comprising a circuit for generating the n-phase applied to the electrode of the transporting member, wherein the circuit

5 comprises a clamper circuit.

37. The developing device of claim 33, further comprising a circuit for generating the n-phase applied to the electrode of the transporting member, wherein the circuit comprises a clamper circuit.

38 The developing device of claim 34, further comprising a circuit for generating the
10 n-phase applied to the electrode of the transporting member, wherein the circuit comprises a clamper circuit.

39. The developing device of claim 11, wherein the voltages applied to the electrodes are from $-V5$ to $-V6$ ($V5 > V6$) at the developing region, and from $+V7$ to $+V8$ ($V8 > V7$) at the region after the developing region.

15 40. The developing device of claim 12, wherein the voltages applied to the electrodes are from $-V5$ to $-V6$ ($V5 > V6$) at the developing region, and from $+V7$ to $+V8$ ($V8 > V7$) at the region after the developing region.

41. The developing device of claim 11, wherein the voltages applied to the electrodes are from $+V9$ to $+V10$ ($V10 > V9$) at the developing region, and from $-V11$
20 to $-V12$ ($V11 > V12$) at the region after the developing region.

42 The developing device of claim 12, wherein the voltages applied to the electrodes are from $+V9$ to $+V10$ ($V10 > V9$) at the developing region, and from $-V11$ to $-V12$ ($V11 > V12$) at the region after the developing region.

43. The developing device of claim 39, further comprising a circuit for generating
25 the n-phase voltages applied to the electrode of the transporting member, wherein the circuit comprises a clamper circuit, and wherein the clamper circuit comprises a means for generating a DC bias voltage.

44. The developing device of claim 40, further comprising a circuit for generating

5 the n-phase voltages applied to the electrode of the transporting member, wherein
the circuit comprises a clamper circuit, and wherein the clamper circuit comprises a
means for generating a DC bias voltage.

45. The developing device of claim 41, further comprising a circuit for generating
the n-phase voltages applied to the electrode of the transporting member, wherein the
10 circuit comprises a clamper circuit, and wherein the clamper circuit comprises a means
for generating a DC bias voltage.

46. The developing device of claim 42, further comprising a circuit for generating
the n-phase voltages applied to the electrode of the transporting member, wherein the
circuit comprises a clamper circuit, and wherein the clamper circuit comprises a means
15 for generating a DC bias voltage.

47. The developing device of claim 43, wherein the means for generating a DC
bias voltage is able to vary the DC bias voltage.

48. The developing device of claim 44, wherein the means for generating a DC
bias voltage is able to vary the DC bias voltage.

20 49. The developing device of claim 45, wherein the means for generating a DC
bias voltage is able to vary the DC bias voltage.

50. The developing device of claim 46, wherein the means for generating a DC
bias voltage is able to vary the DC bias voltage.

51. A developing method, in which a latent image on a latent image supporter is
25 developed with a powder to form a visual image thereon, comprising:

developing the latent image with the powder at a developing region; and

forming an electric field in a direction such that the powder moves in a direction
opposite to the latent image supporter at a region after a developing region.

5 52. A process cartridge, which is detachable from a main body of an image forming device, comprising:

 a housing; and

 the developing device according to claim 1.

 53. A process cartridge, which is detachable from a main body of an image forming
10 device, comprising:

 a housing; and

 the developing device according to claim 7.

 54. A process cartridge, which is detachable from a main body of an image forming device, comprising:

15 a housing; and

 the developing device according to claim 8.

 55. An image forming device, comprising:

 a latent image supporter configured to bear a latent image thereon; and

 a developing device configured to develop the latent image with a powder to form a
20 visual image on the latent image supporter,

 wherein the developing device is the developing device according to claim 1.

 56. An image forming device, comprising:

 a latent image supporter configured to bear a latent image thereon; and

 a developing device configured to develop the latent image with a powder to form a
25 visual image on the latent image supporter,

 wherein the developing device is the developing device according to claim 7.

 57. An image forming device, comprising:

 a latent image supporter configured to bear a latent image thereon; and

5 a developing device configured to develop the latent image with a powder to form a visual image on the latent image supporter,

wherein the developing device is the developing device according to claim 8.

58. An image forming device, comprising:

a latent image supporter configured to bear a latent image thereon; and

10 a process cartridge configured to develop the latent image with a powder to form a visual image on the latent image supporter,

wherein the process cartridge is the process cartridge according to claim 52.

59. An image forming device, comprising:

a latent image supporter configured to bear a latent image thereon; and

15 a process cartridge configured to develop the latent image with a powder to form a visual image on the latent image supporter,

wherein the process cartridge is the process cartridge according to claim 53.

60. An image forming device, comprising:

a latent image supporter configured to bear a latent image thereon; and

20 a process cartridge configured to develop the latent image with a powder to form a visual image on the latent image supporter,

wherein the process cartridge is the process cartridge according to claim 54.

61. An image forming device for forming a color image, comprising:

at least one latent image supporter configured to bear a latent image thereon; and a

25 plurality of process cartridges each configured to develop the latent image with a powder to form a visual image on the image supporter, wherein each of the plurality of process cartridges is the process cartridge according to claim 52.

62. An image forming device for forming a color image, comprising:

- 5 at least one latent image supporter configured to bear a latent image thereon; and a plurality of process cartridges each configured to develop the latent image with a powder to form a visual image on the image supporter, wherein each of the plurality of process cartridges is the process cartridge according to claim 53.

63. An image forming device for forming a color image, comprising:

- 10 at least one latent image supporter configured to bear a latent image thereon; and a plurality of process cartridges each configured to develop the latent image with a powder to form a visual image on the image supporter, wherein each of the plurality of process cartridges is the process cartridge according to claim 54.

64. An image forming method, comprising:

- 15 forming a latent image on a latent image supporter;
 developing the latent image with a powder at a developing region; and
 forming an electric field in a direction such that the powder moves in a direction opposite to the latent image supporter at a region after the developing region.

5

ABSTRACT OF THE INVENTION

A developing device is provided. The developing device comprises a latent image supporter, wherein powder is adhered on the latent image supporter to develop a latent image on the latent image supporter; a transporting member arranged opposite to the latent image supporter; and a plurality of electrodes formed in the transporting member
10 for generating a traveling-wave electric field to move the powder, wherein n-phase voltages are applied to the electrodes of the transporting member to form an electric field in a first direction so that the powder moves towards the latent image supporter at an image portion of the latent image and in a second direction so that the powder moves in a direction opposite to the latent image supporter at a non-image portion of the latent
15 image.

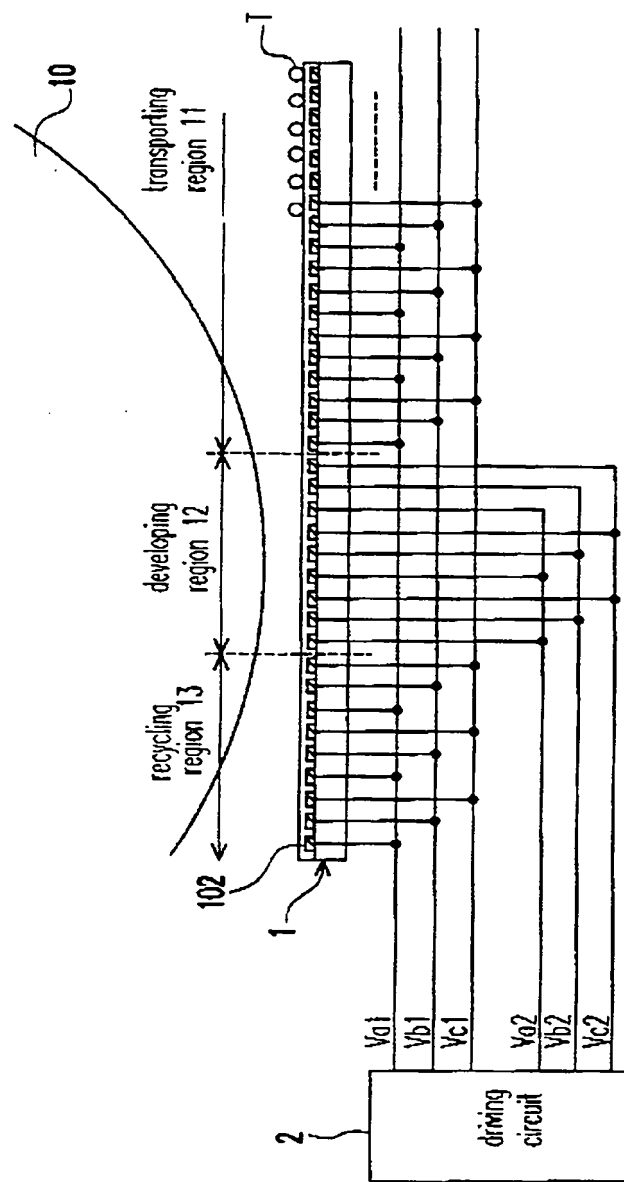
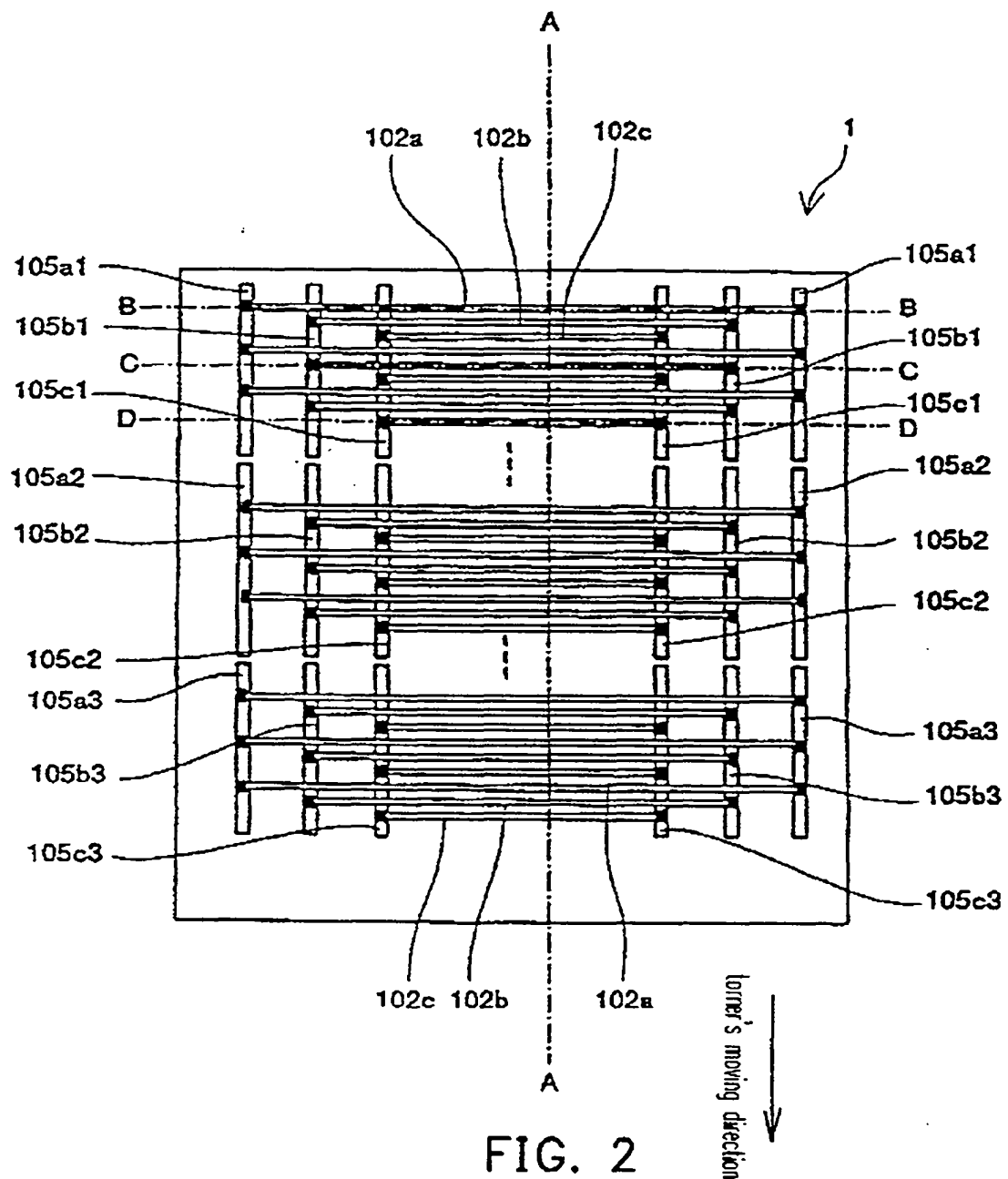


FIG. 1



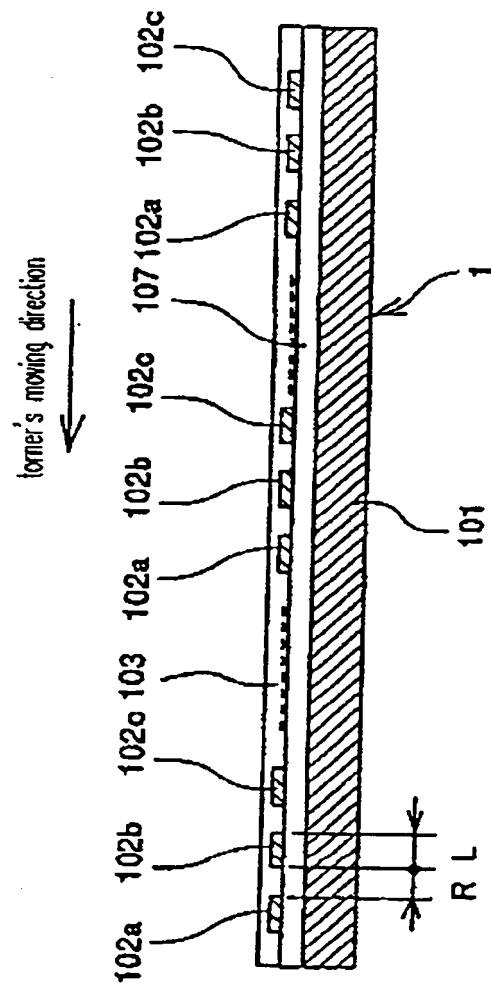


FIG. 3

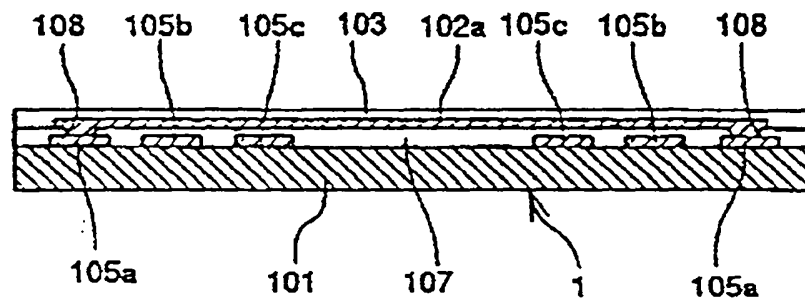


FIG. 4

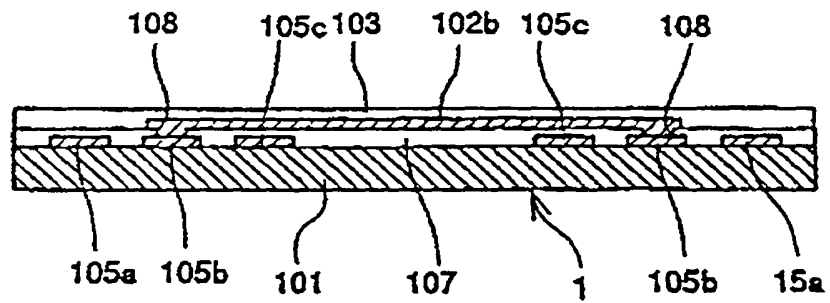


FIG. 5

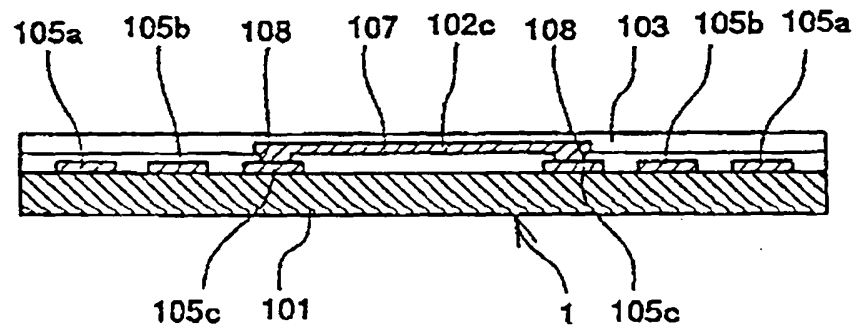


FIG. 6

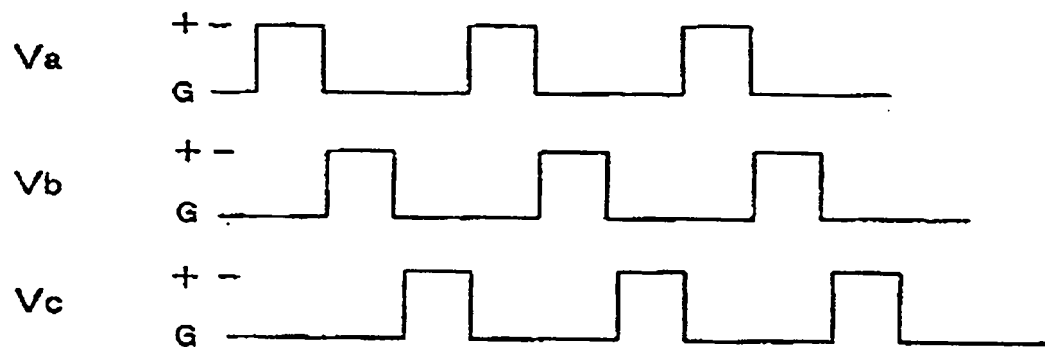
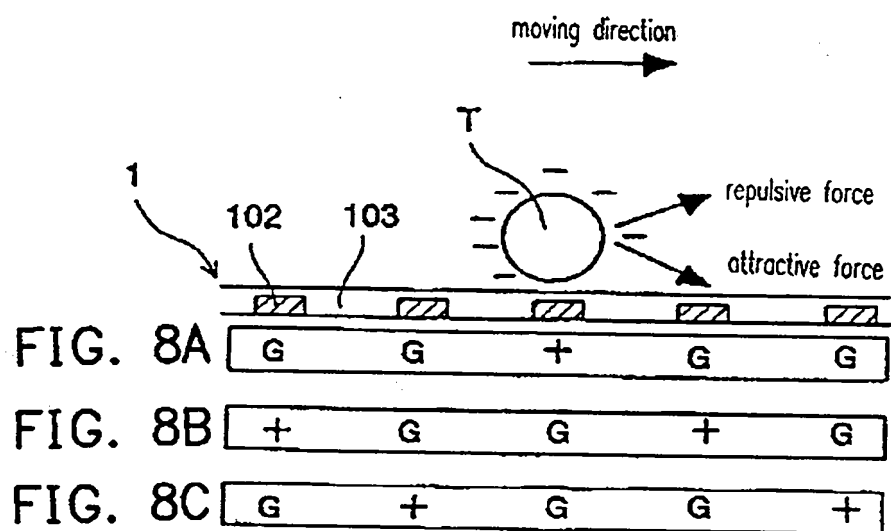
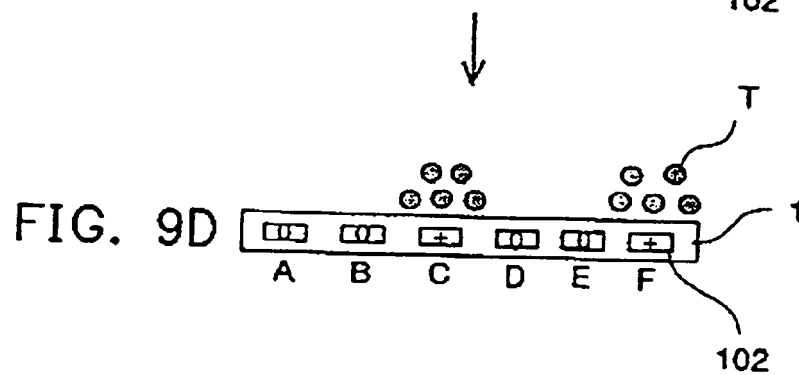
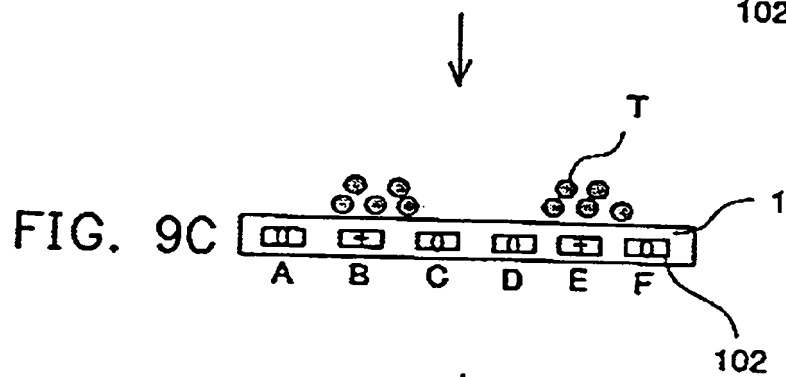
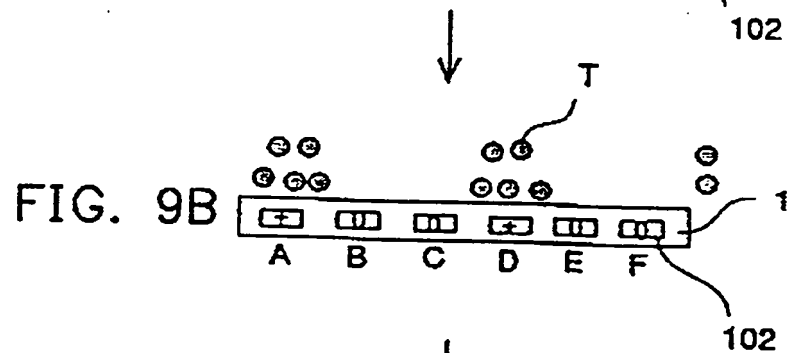
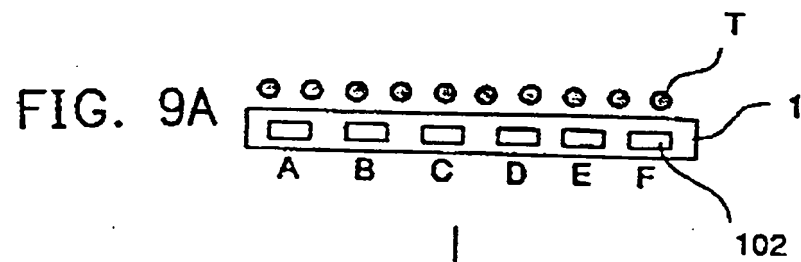


FIG. 7





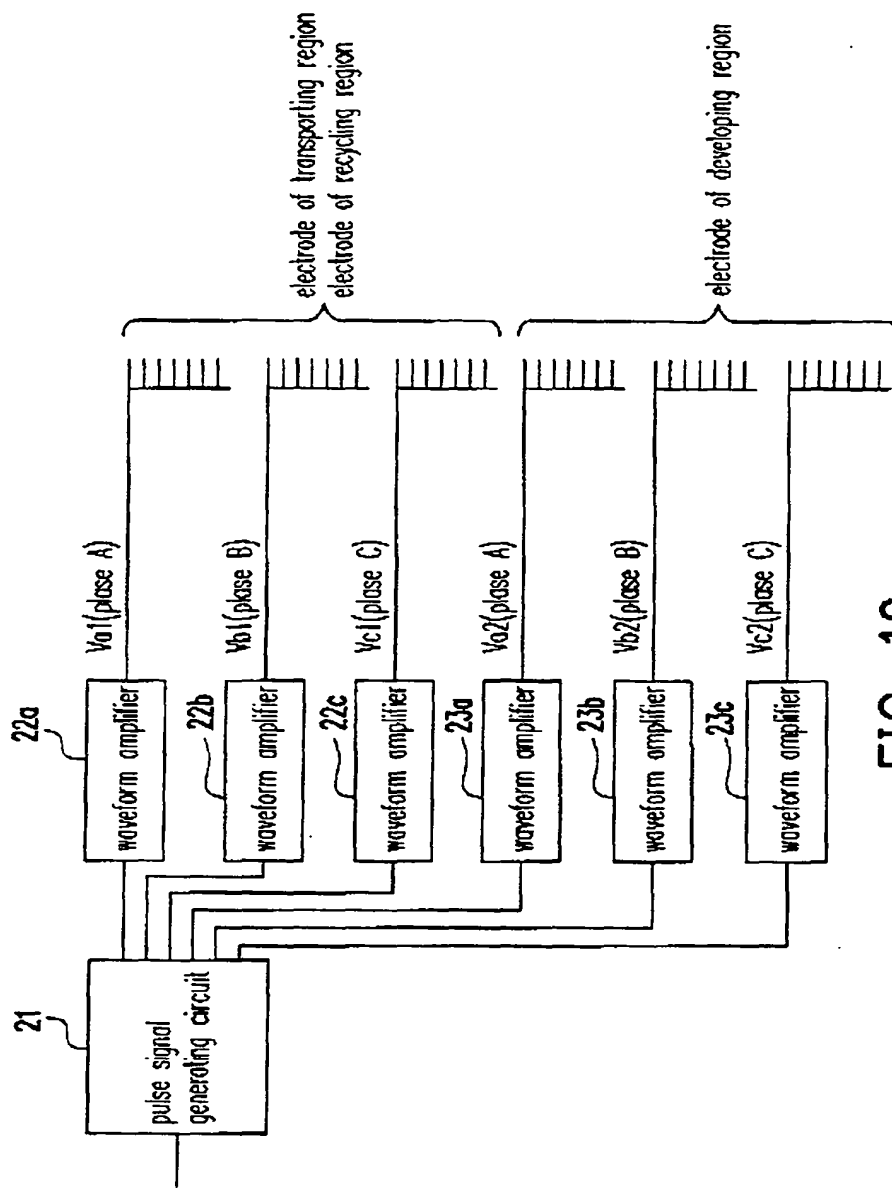


FIG. 10

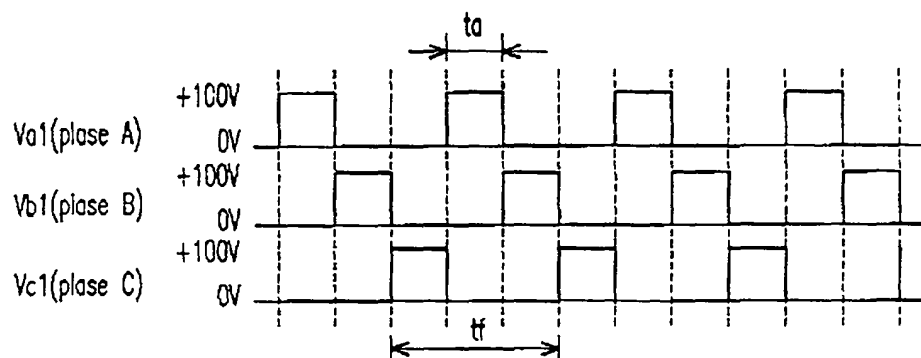


FIG. 11

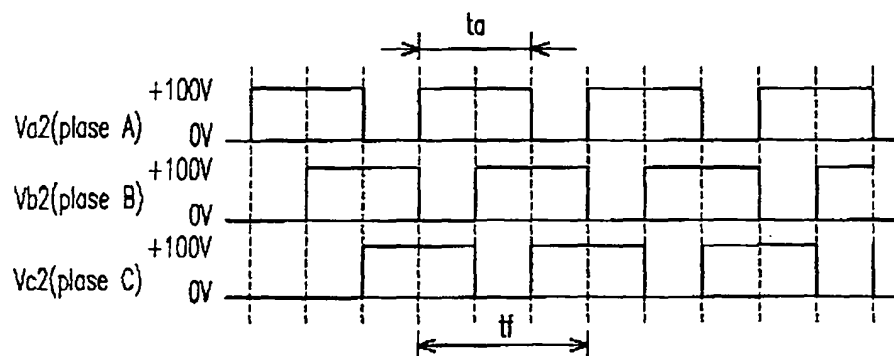


FIG. 12

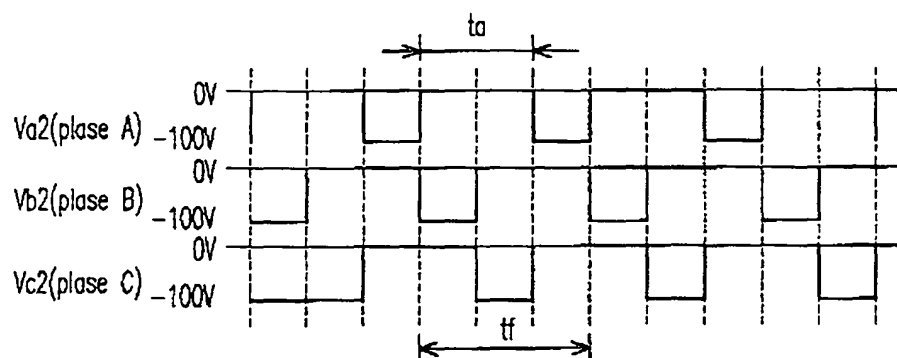


FIG. 13

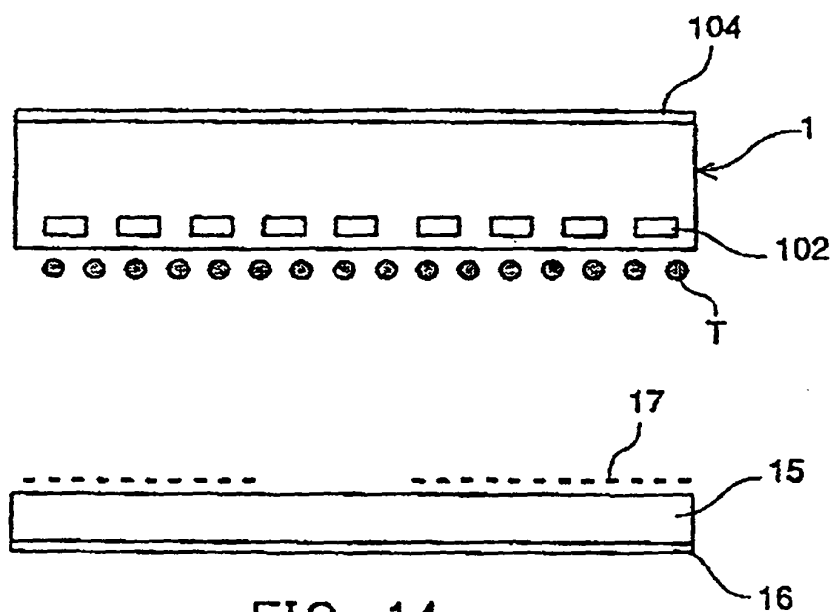


FIG. 14

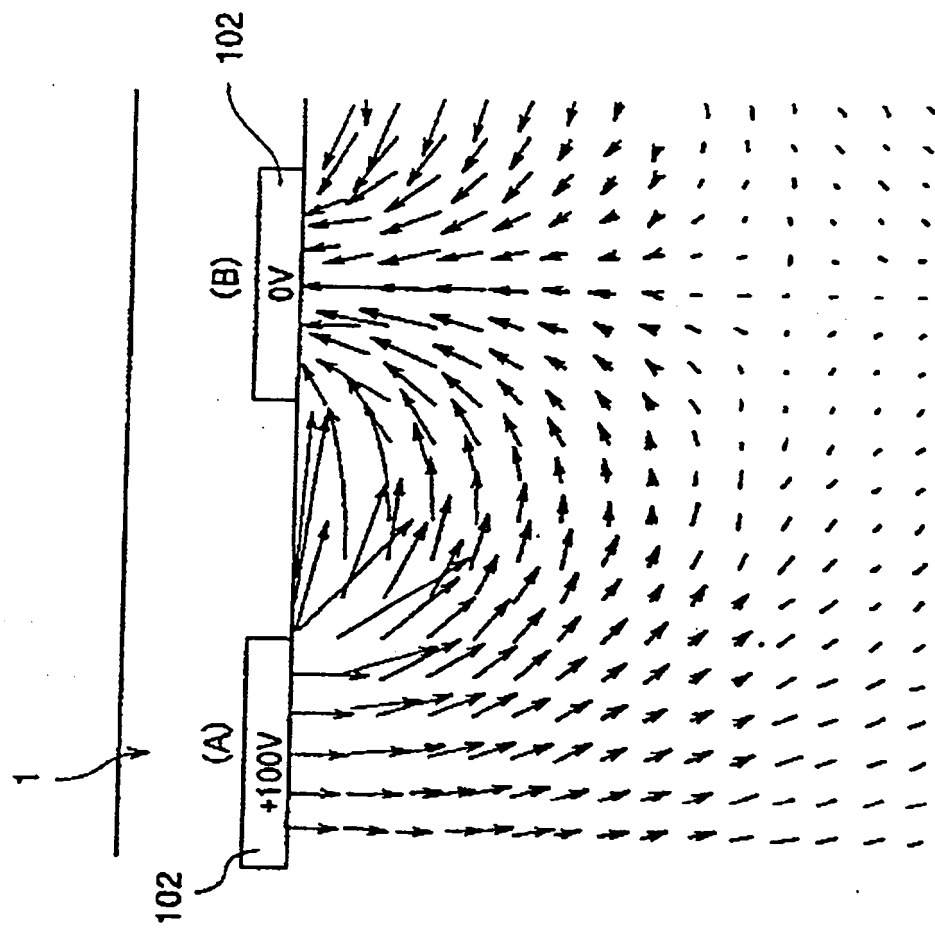


FIG. 15

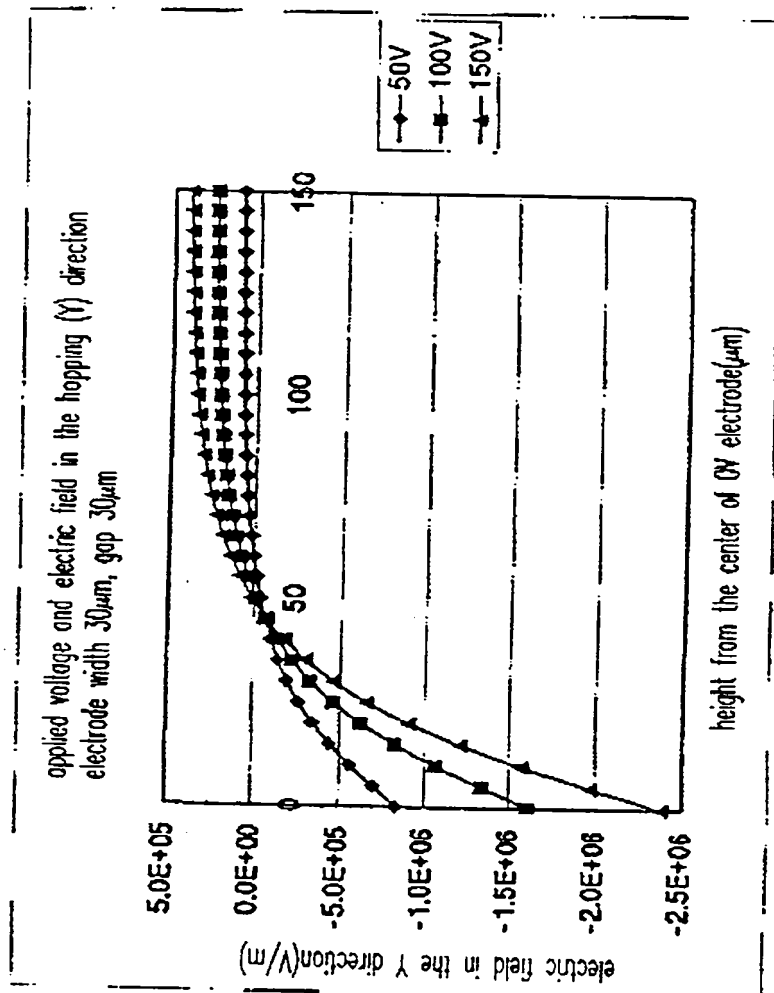


FIG. 16

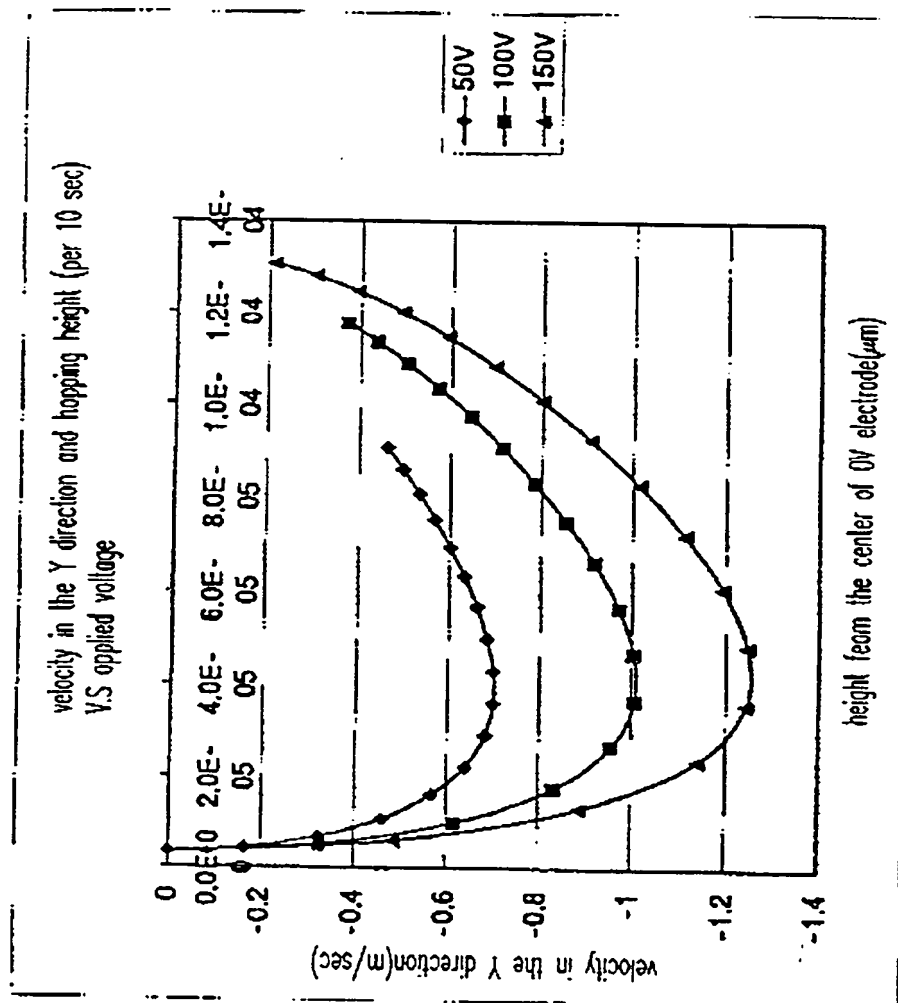


FIG. 17

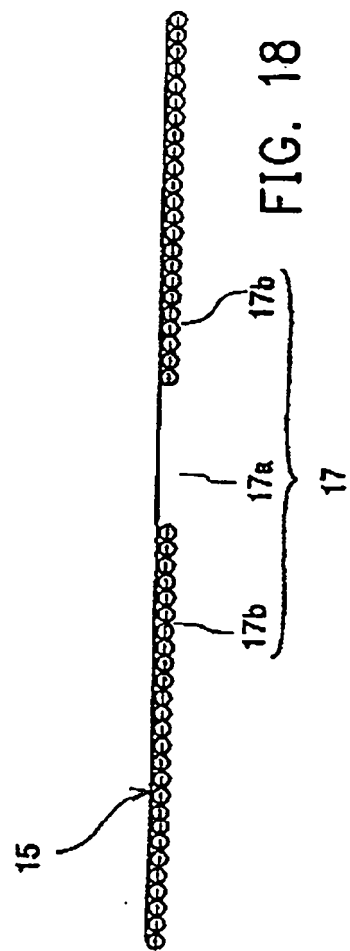
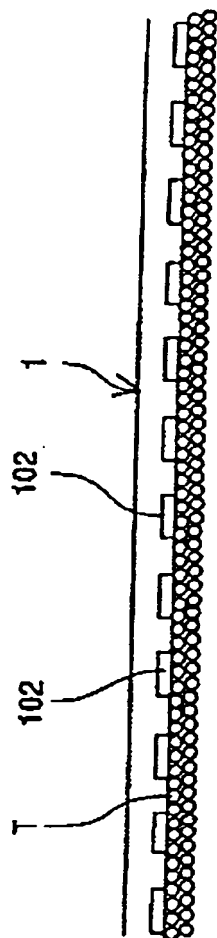


FIG. 18

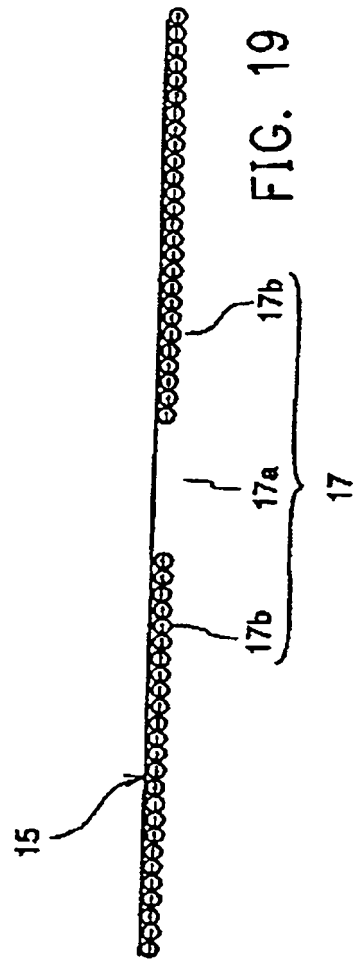
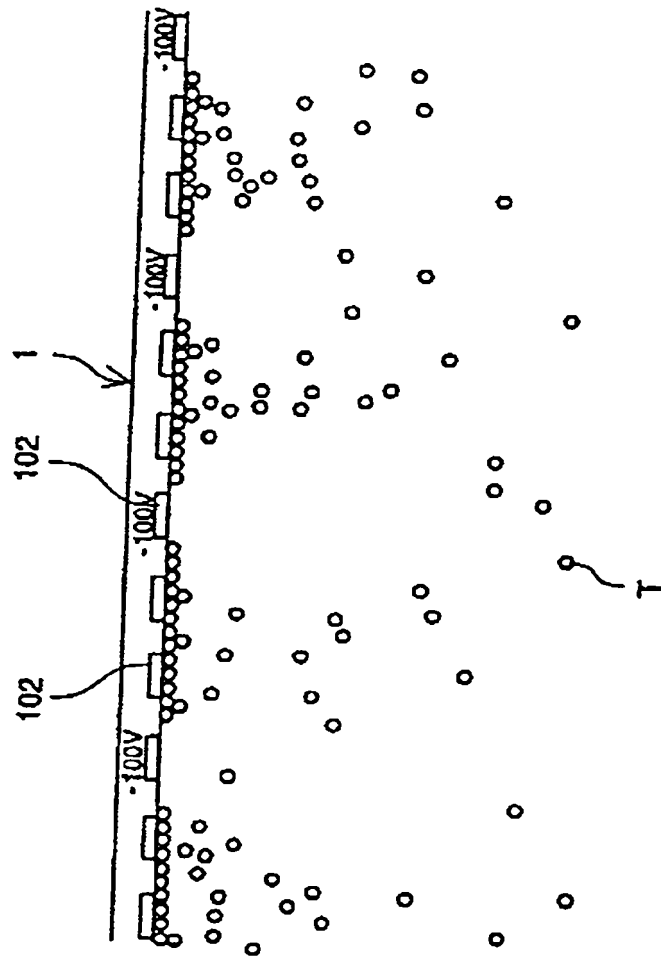
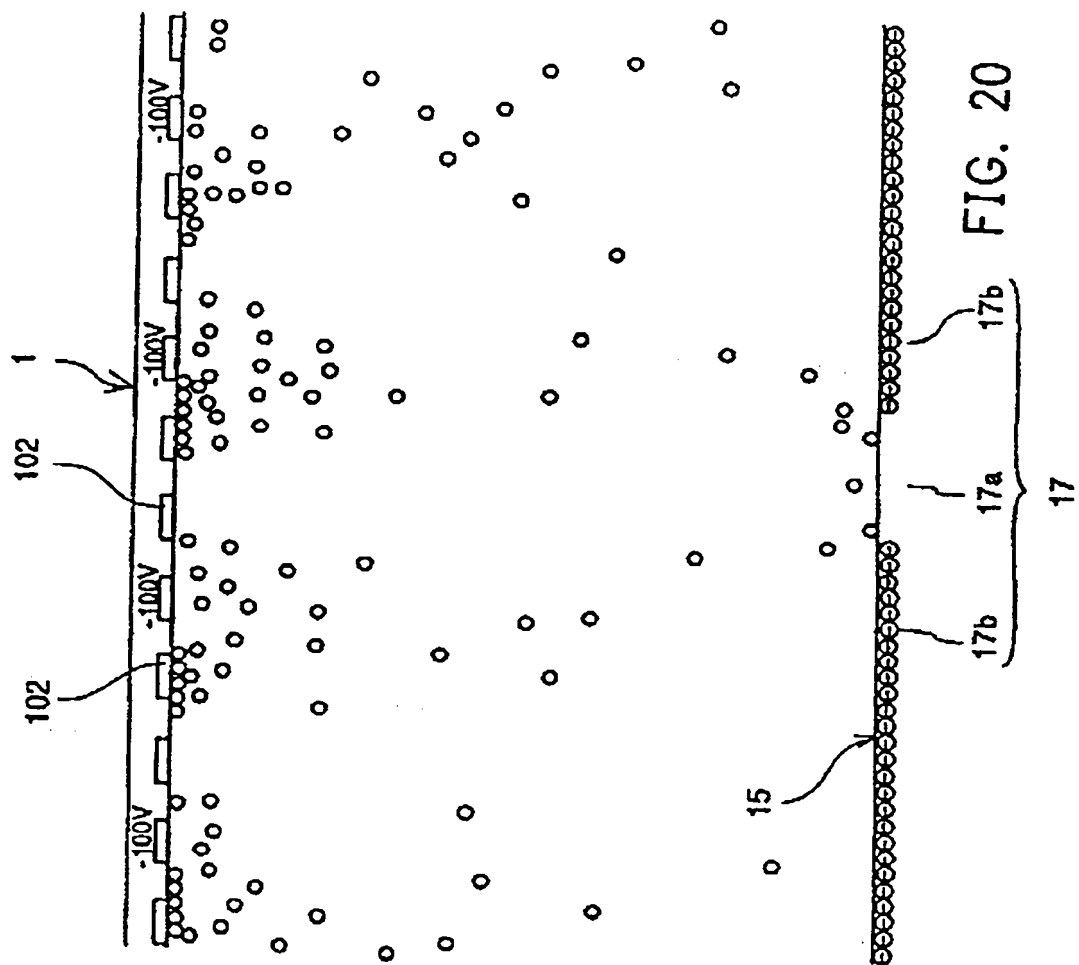


FIG. 19



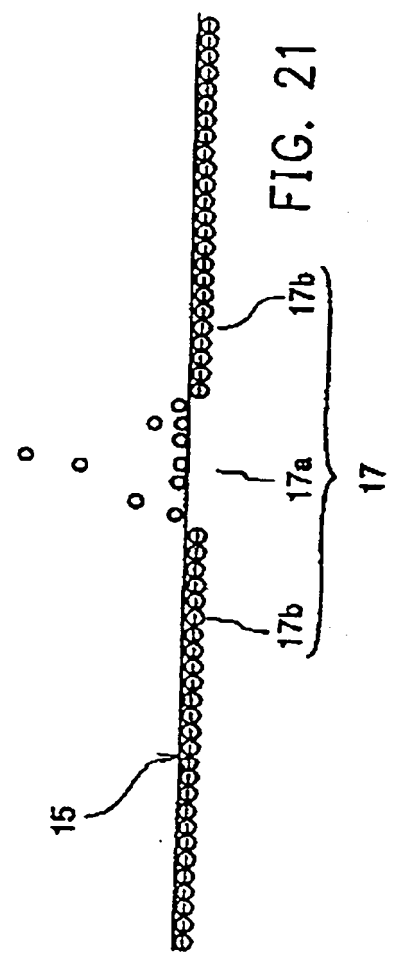
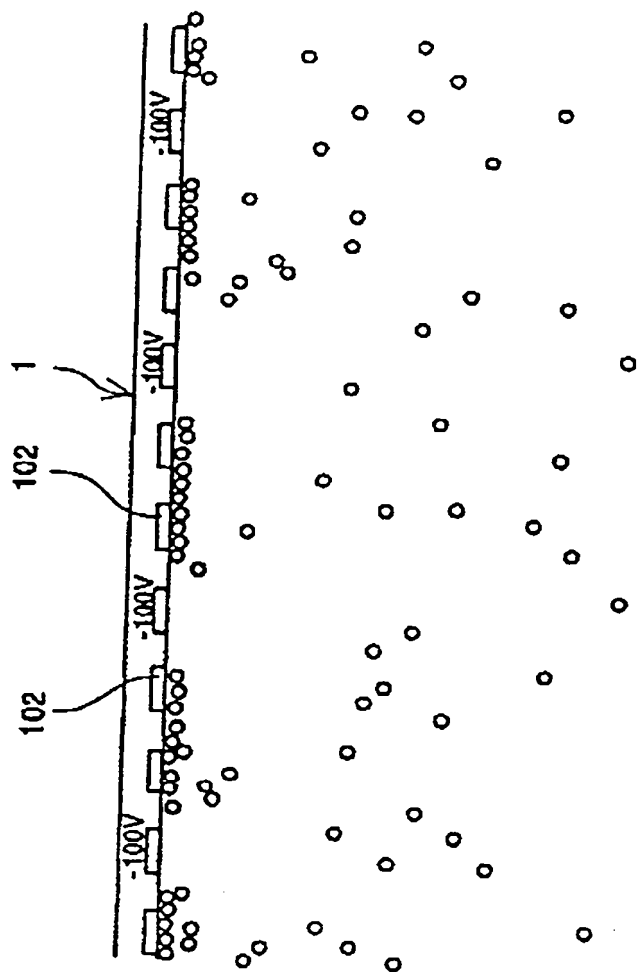


FIG. 21

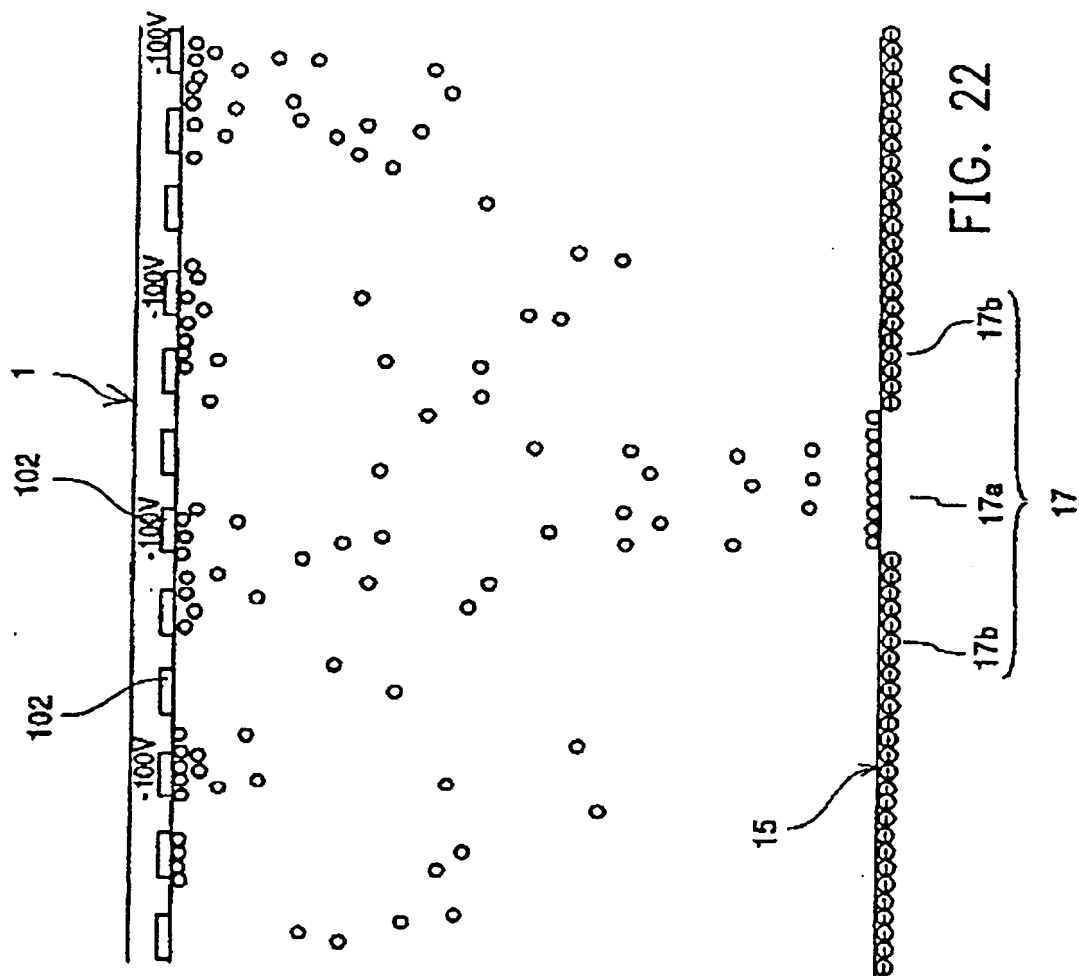
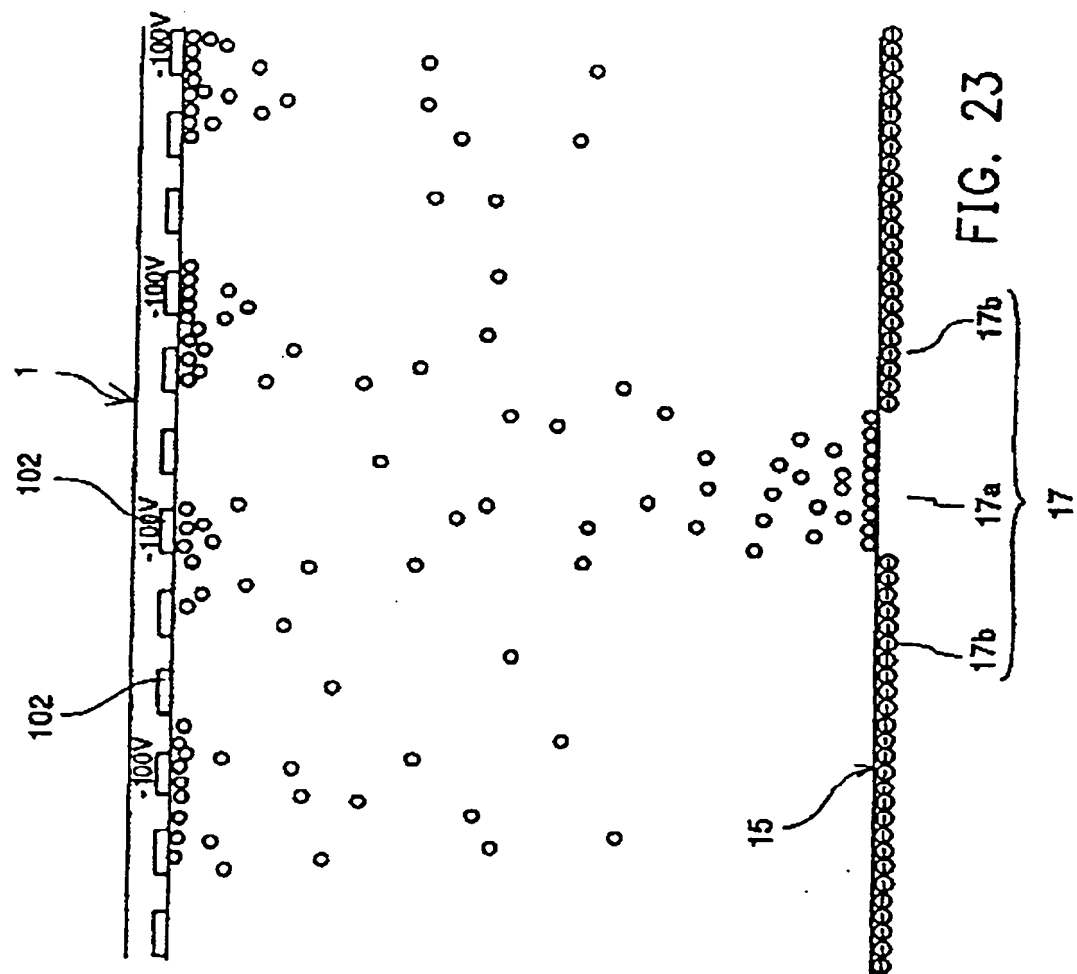
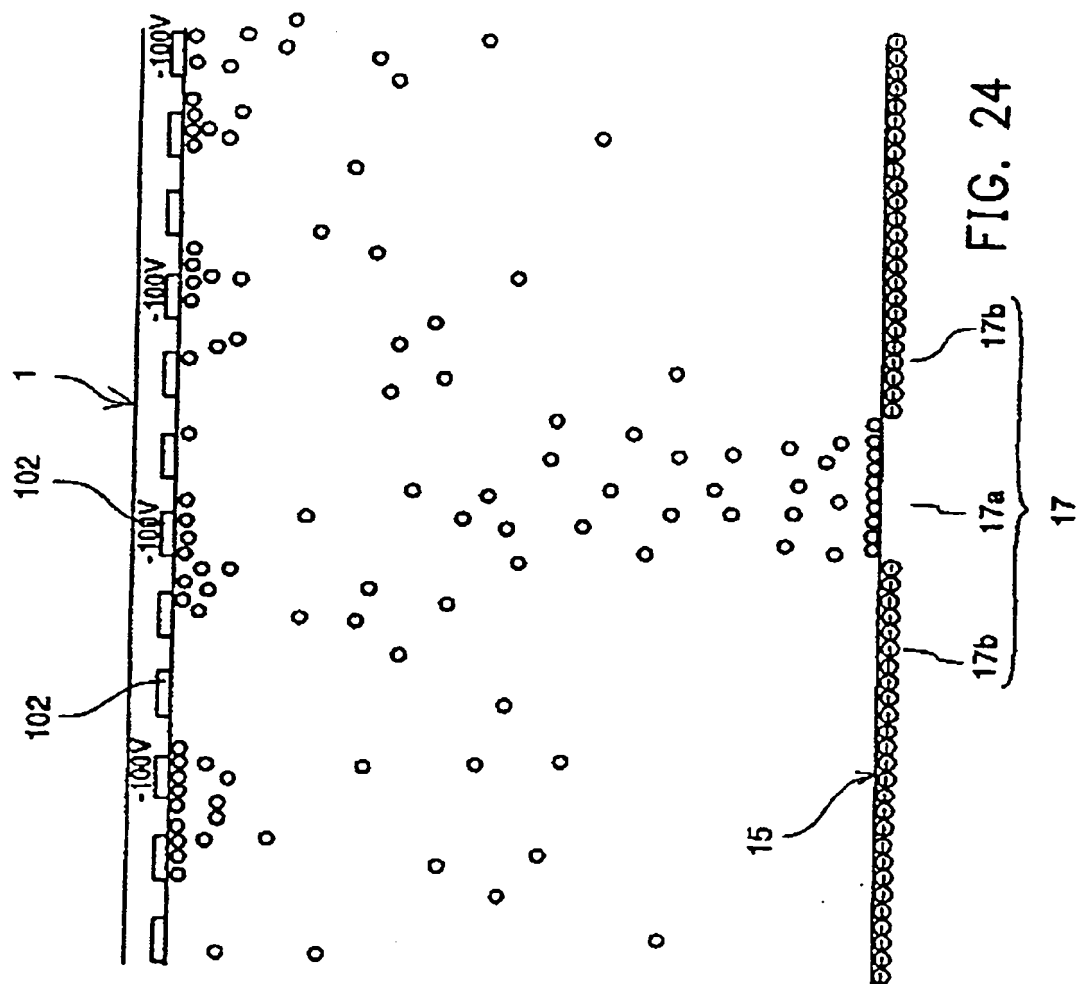
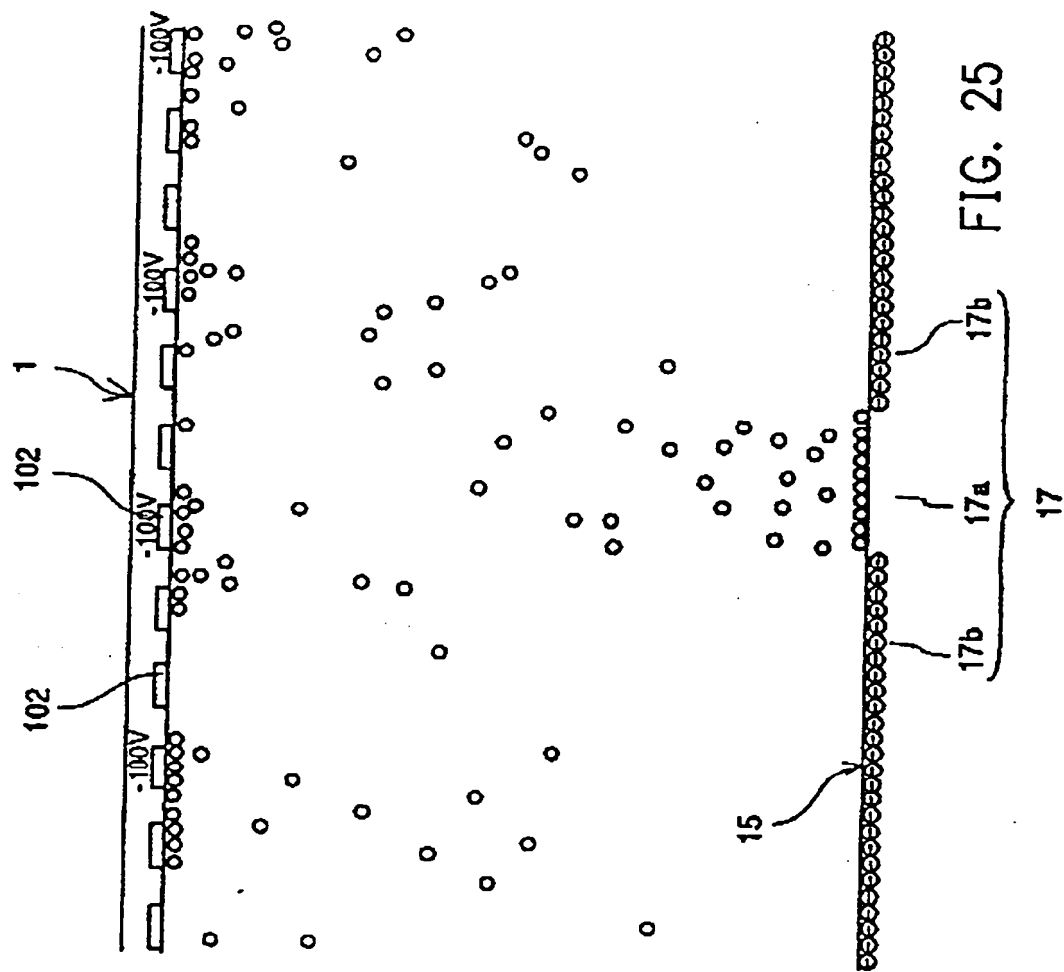


FIG. 22







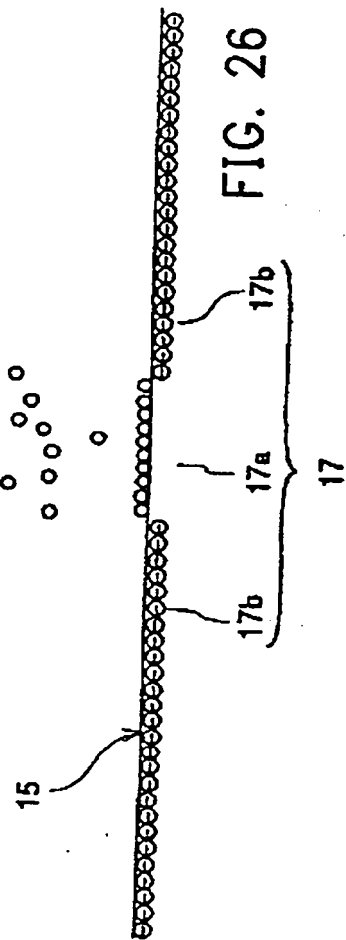
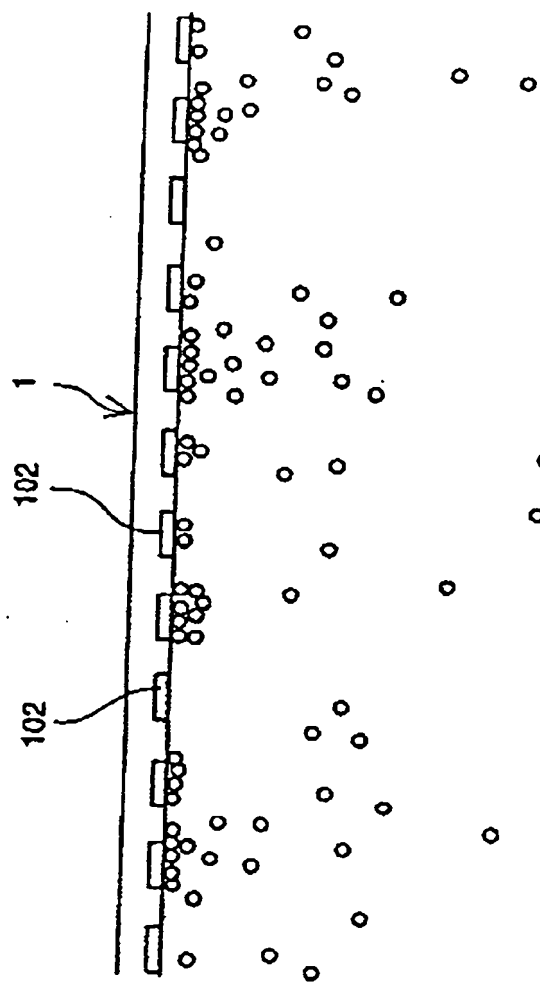


FIG. 26

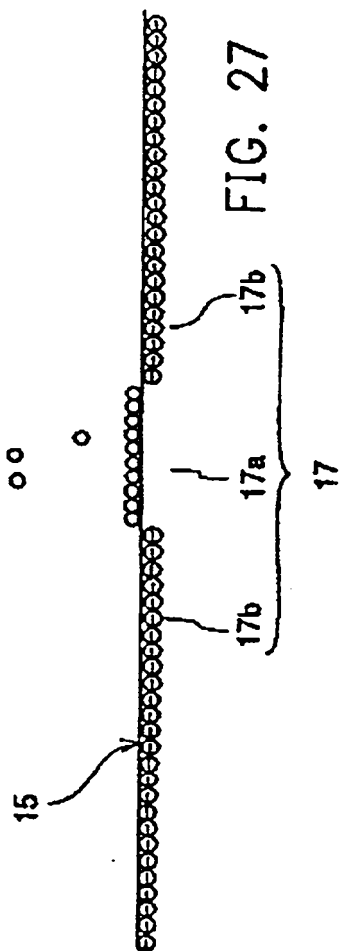
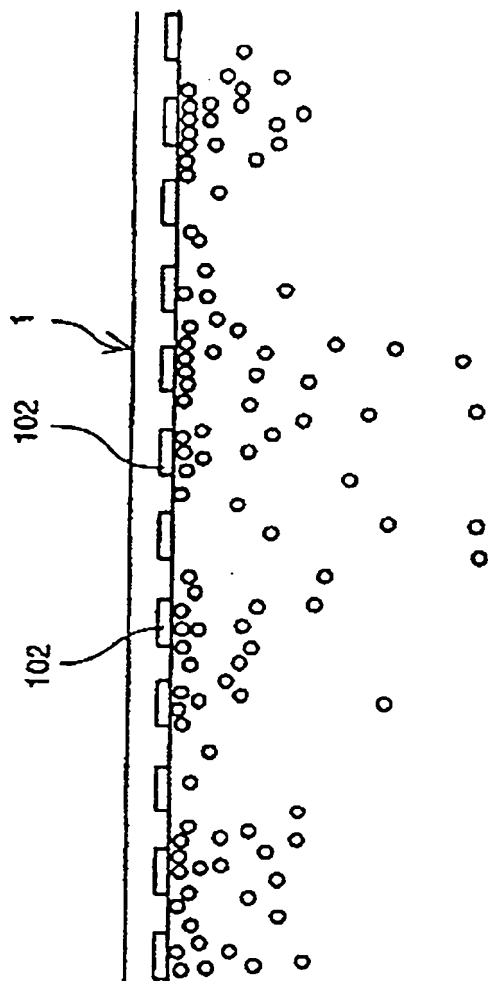


FIG. 27

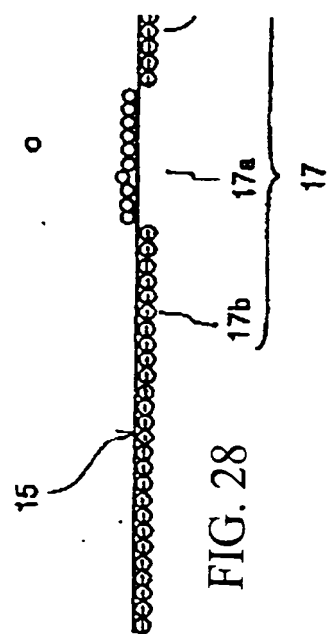
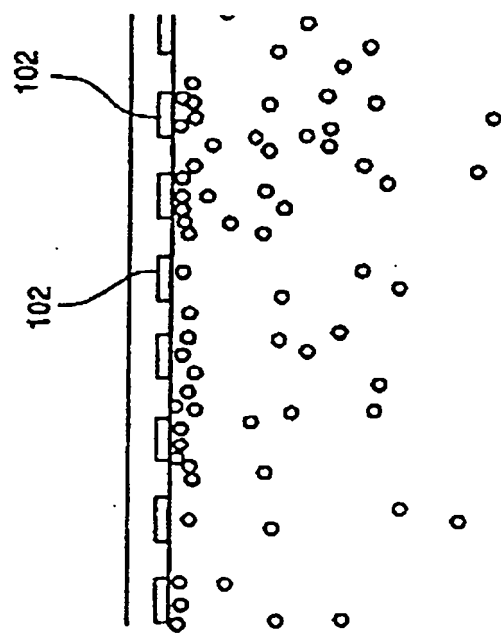


FIG. 28

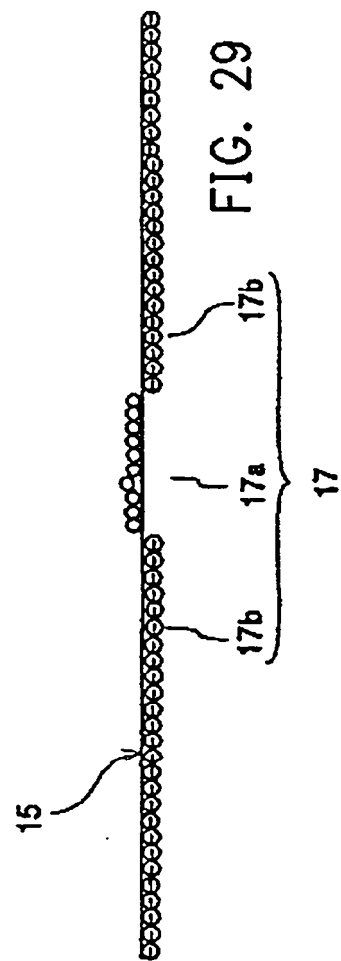
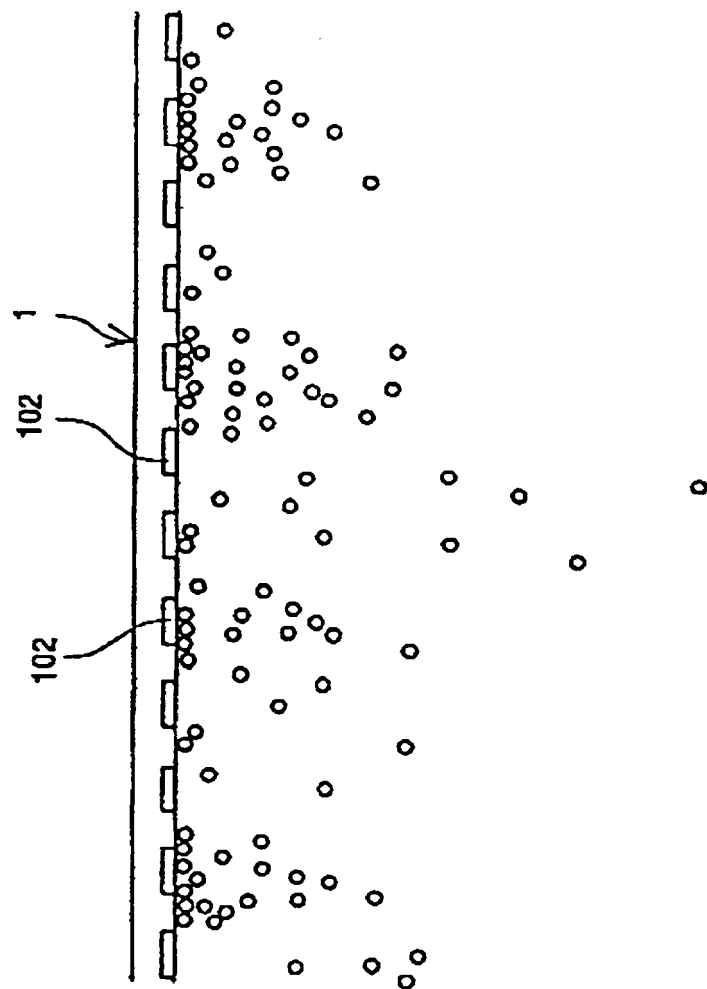


FIG. 29

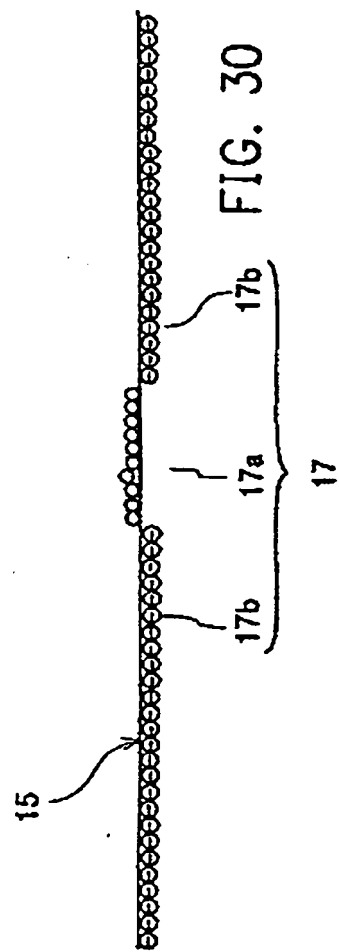
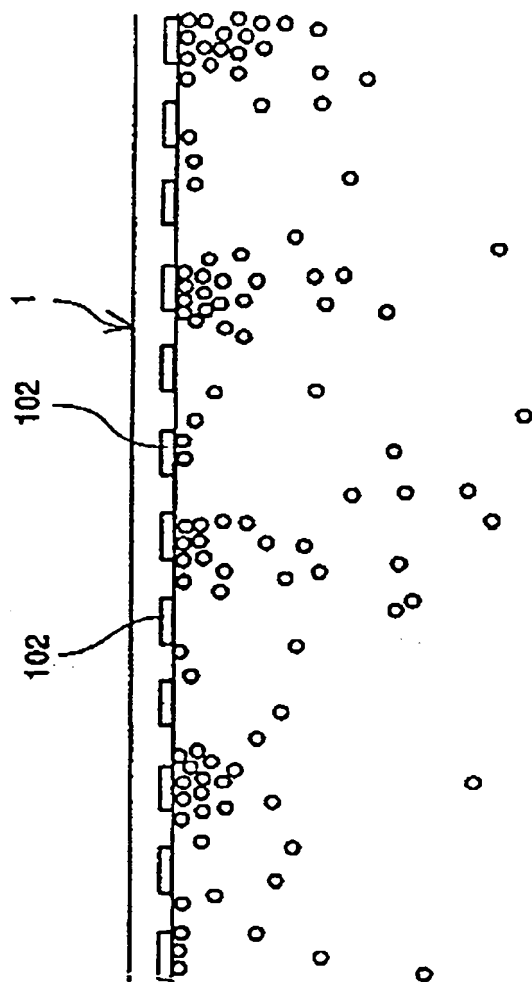


FIG. 30

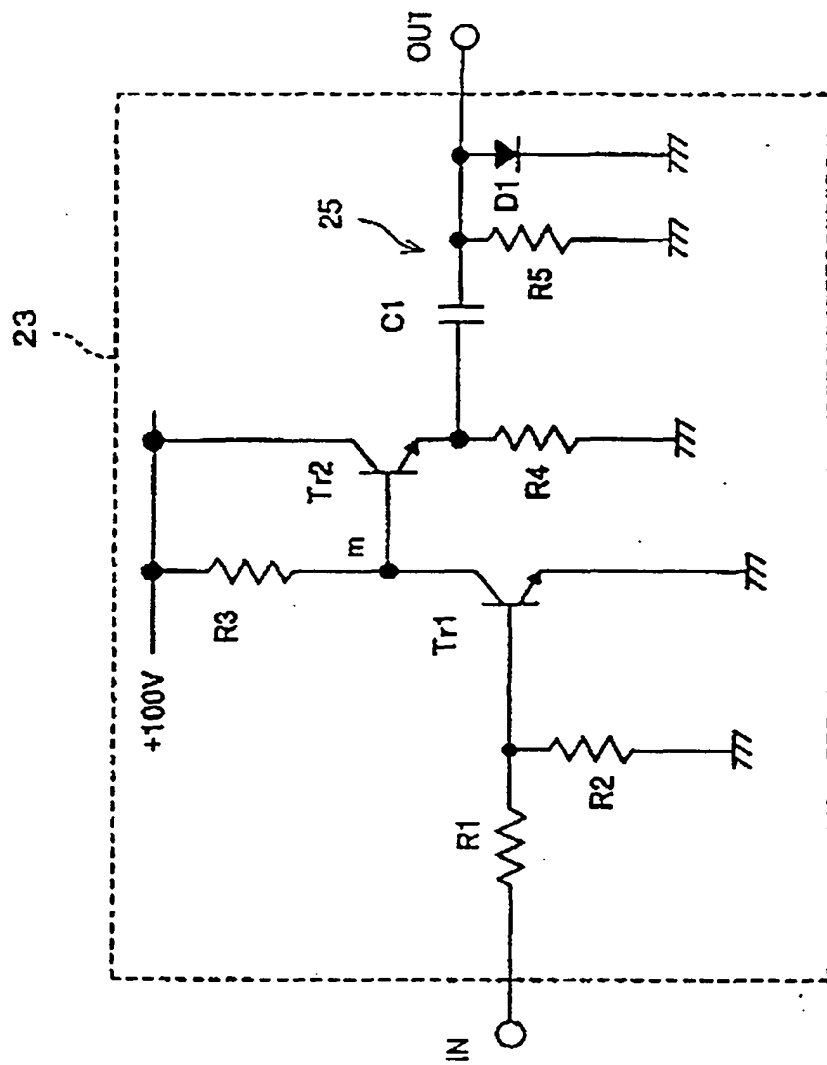


FIG. 31

FIG. 32A IN



FIG. 32B m

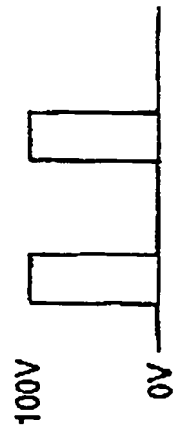
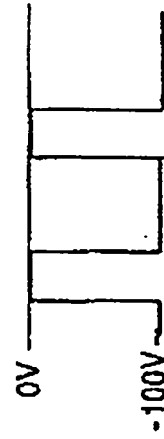


FIG. 32C OUT



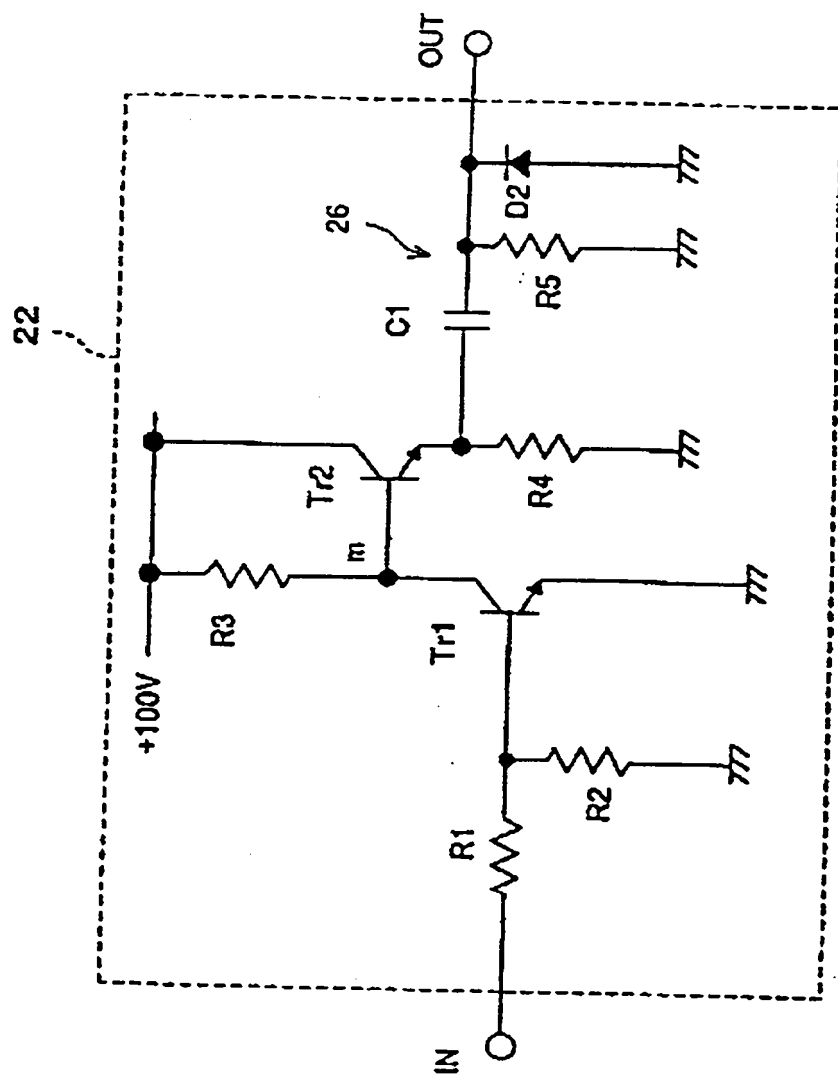


FIG. 33

FIG. 34A IN



FIG. 34B m

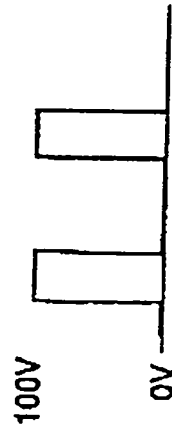
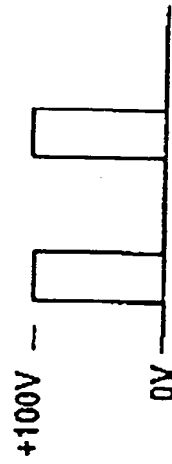


FIG. 34C out



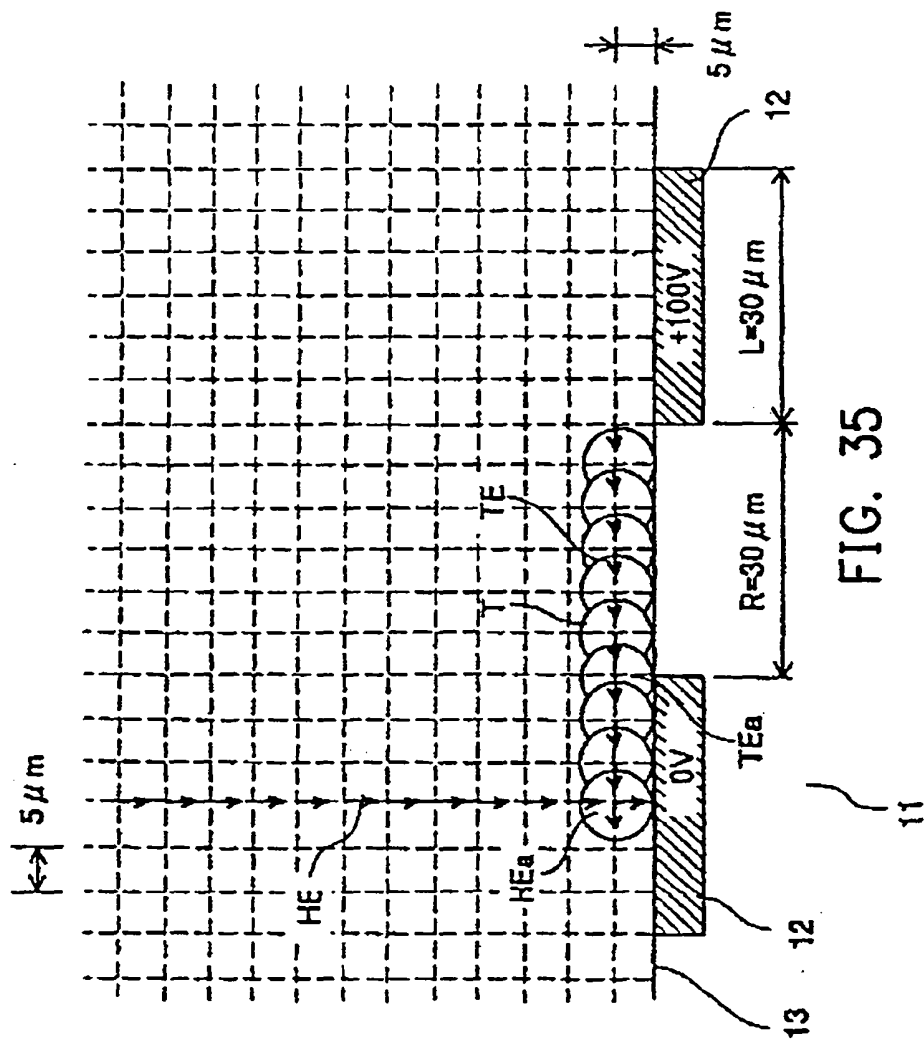


FIG. 35

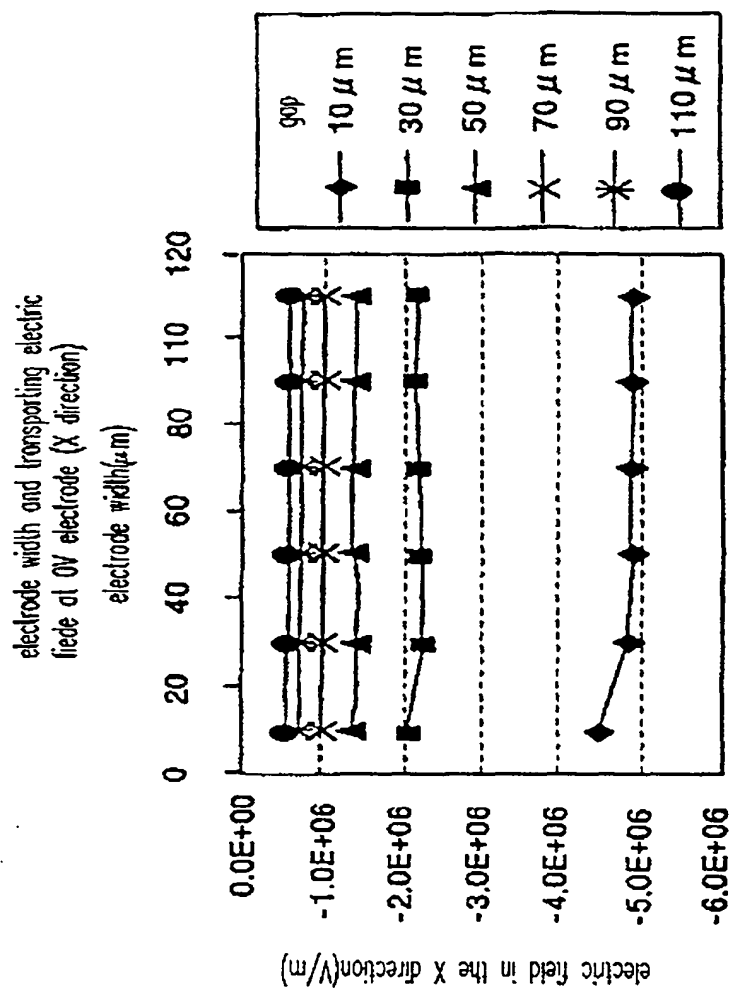


FIG. 36

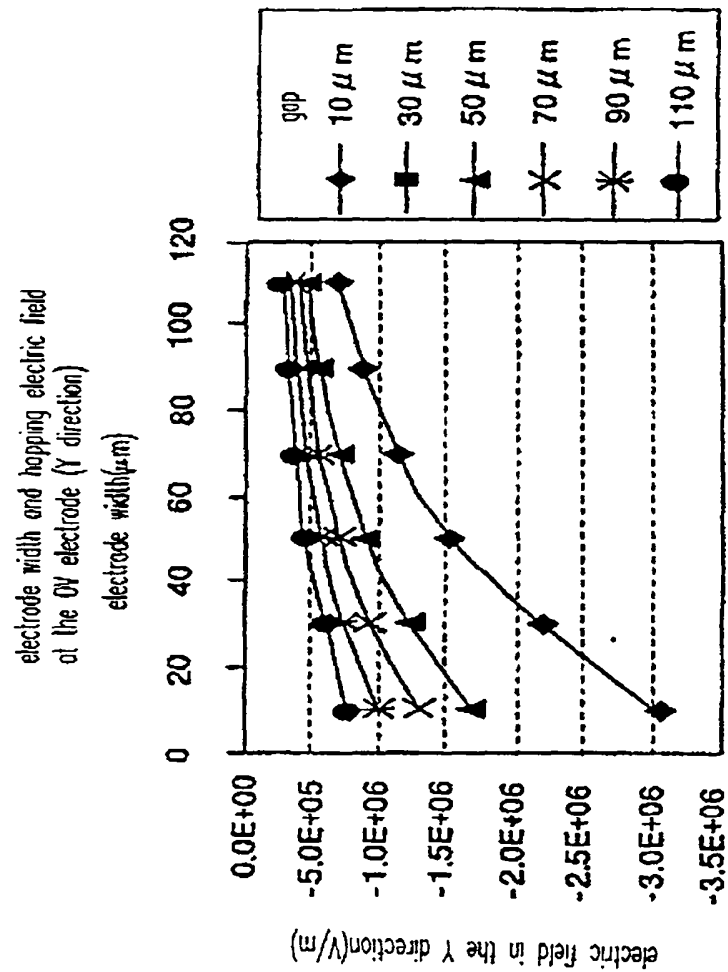


FIG. 37

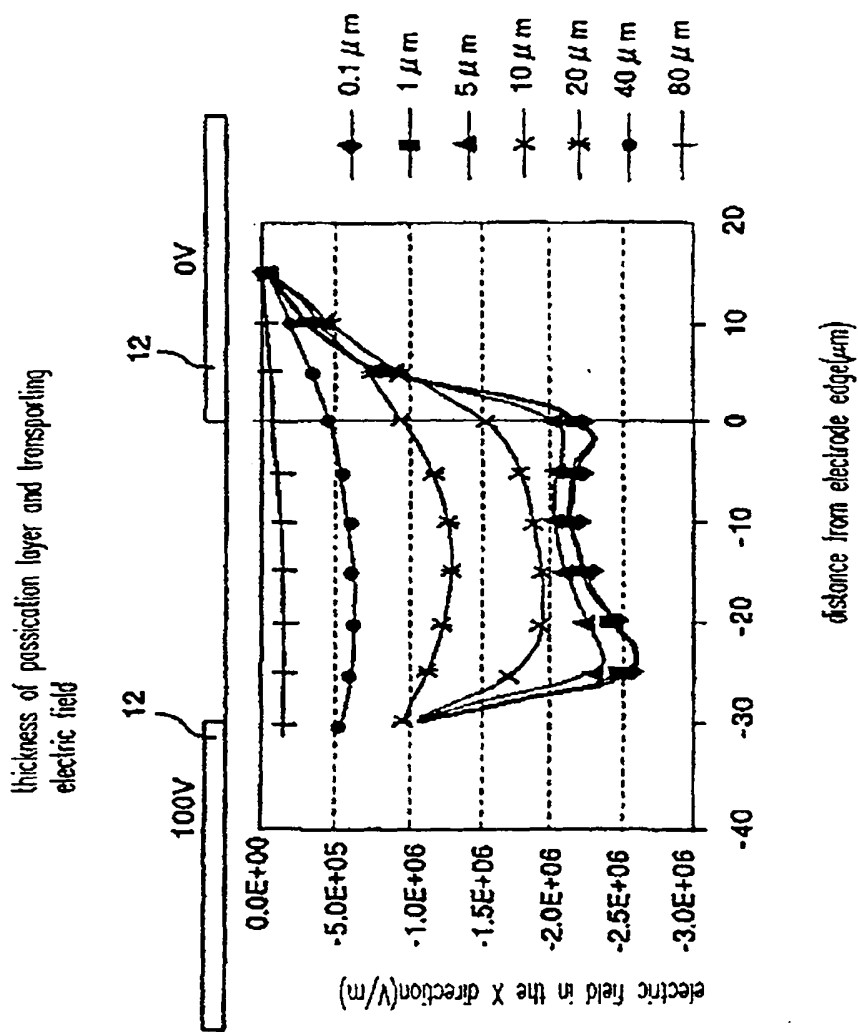


FIG. 38

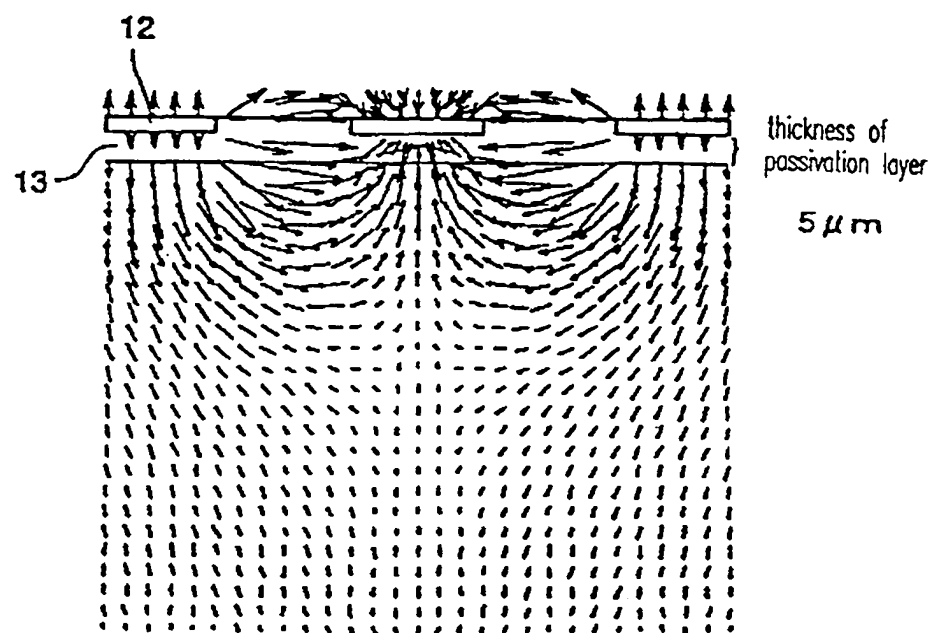


FIG. 39

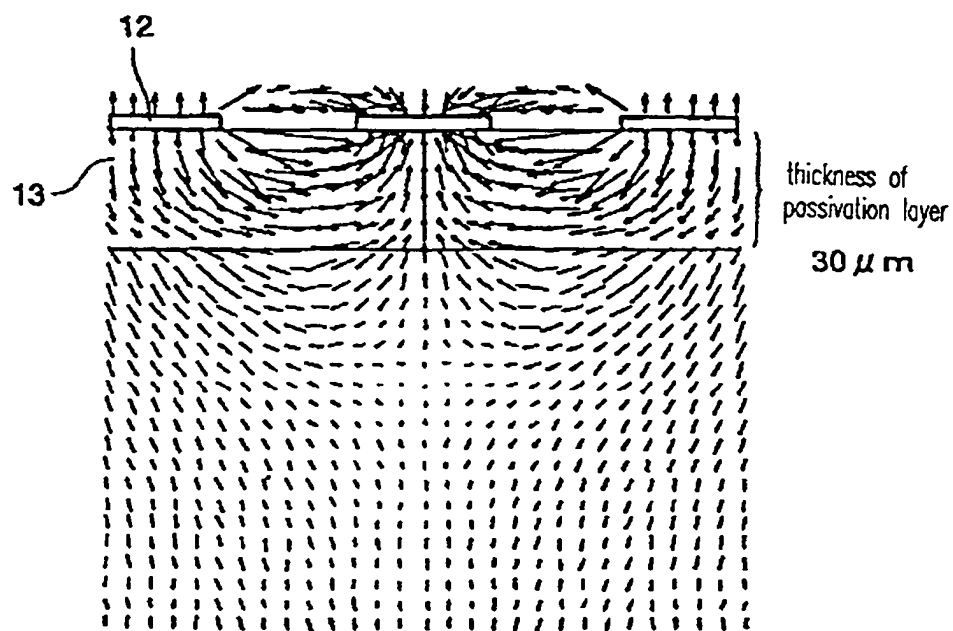


FIG. 40

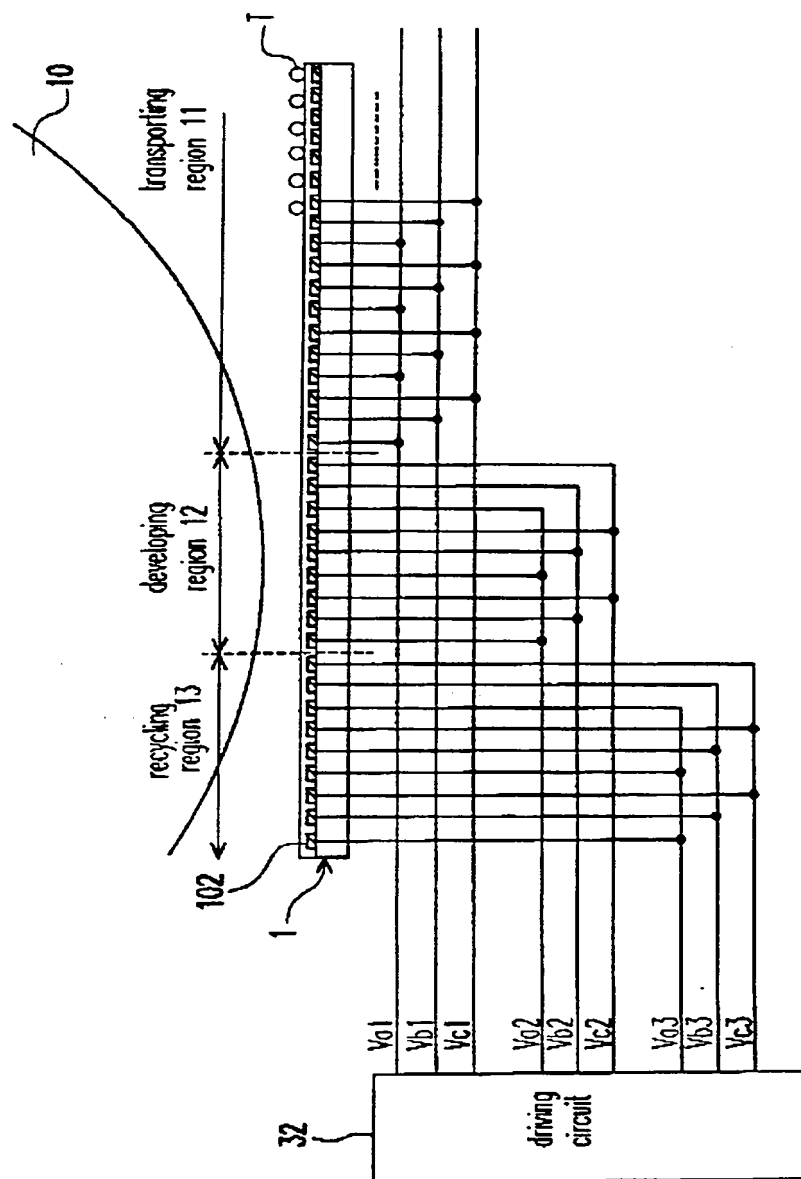


FIG. 41

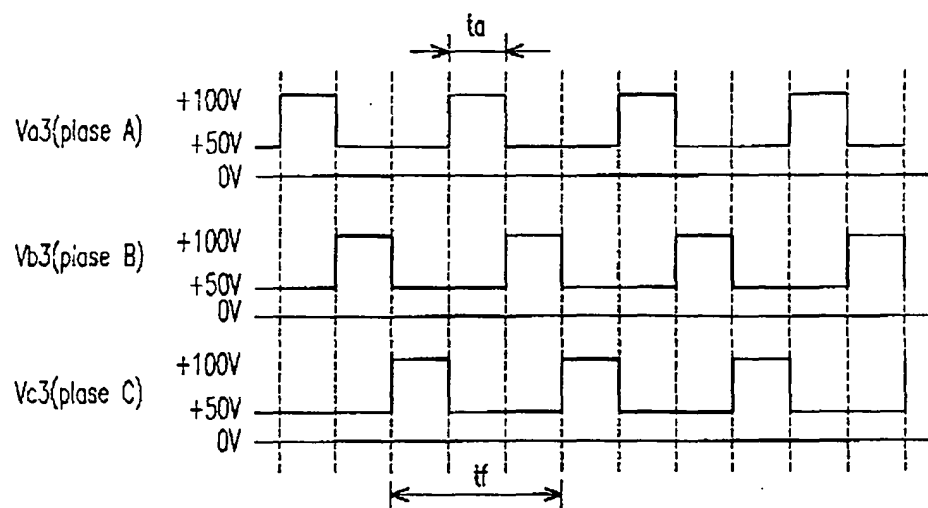


FIG. 42

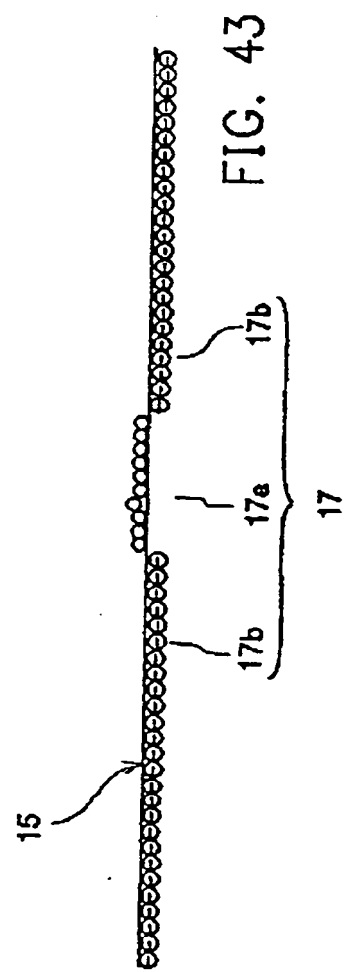
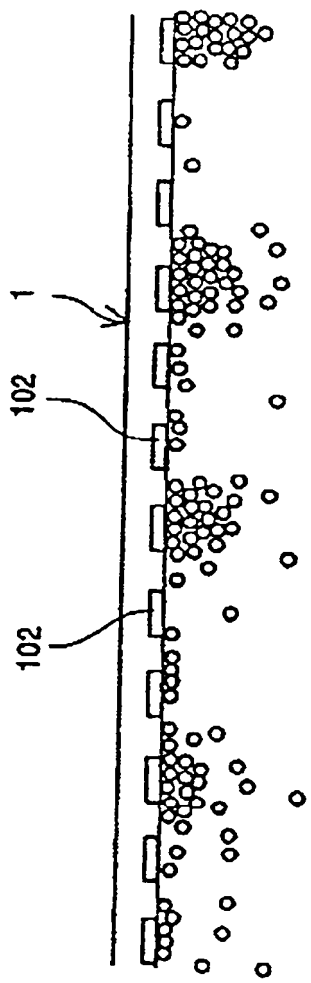


FIG. 43

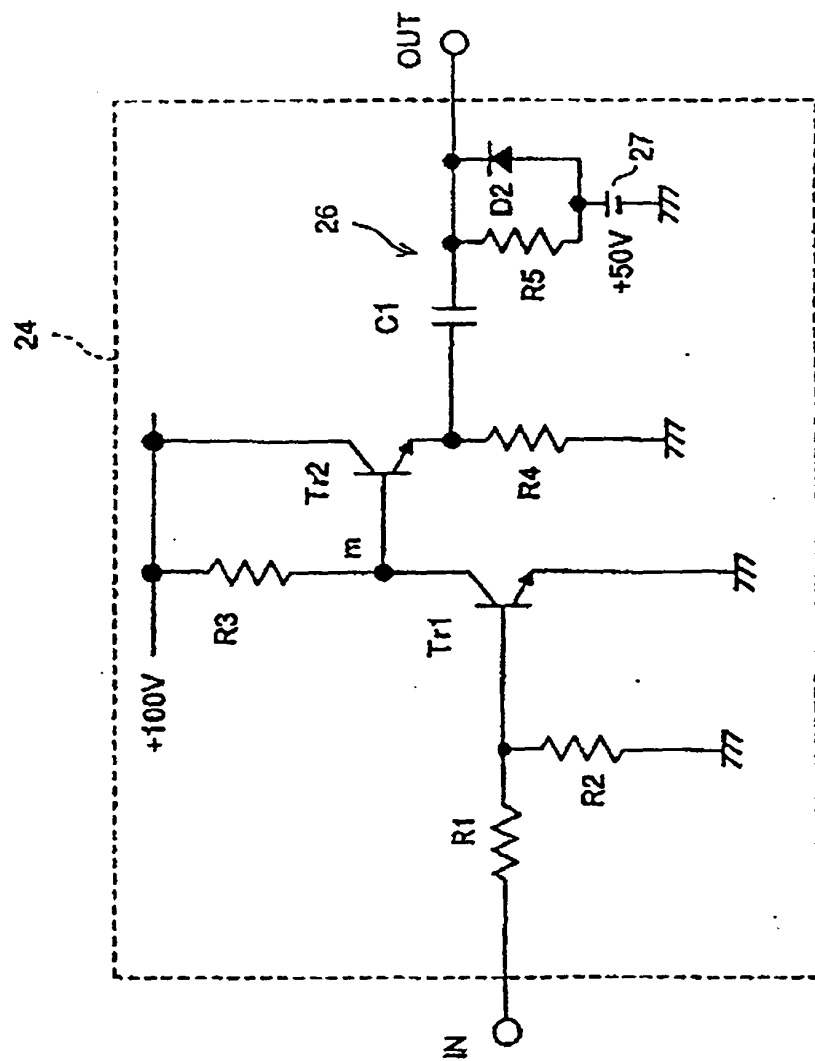


FIG. 44

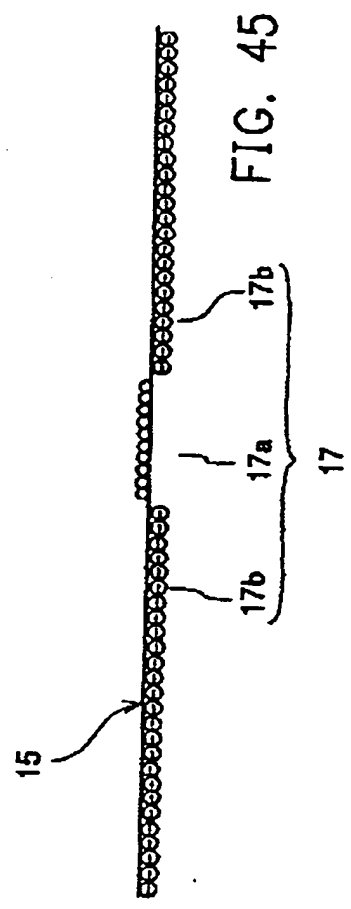
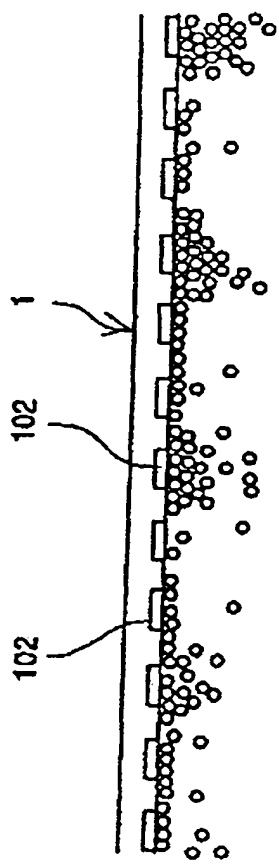


FIG. 45

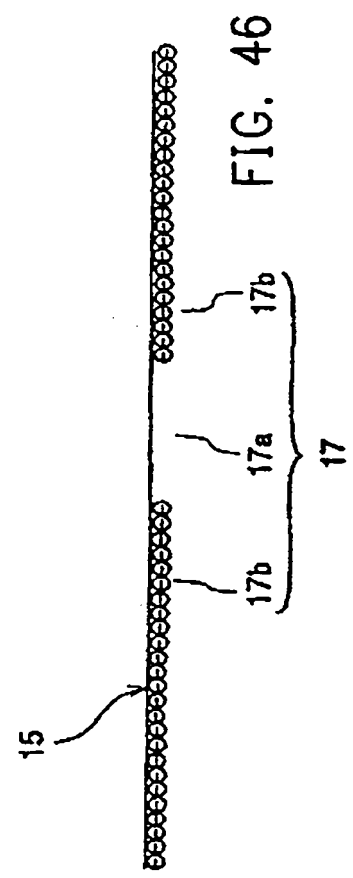
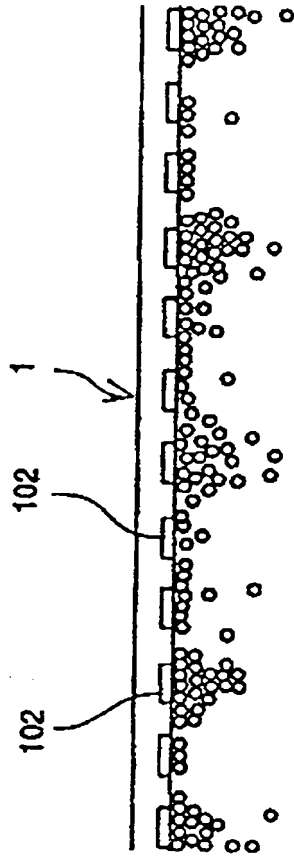


FIG. 46

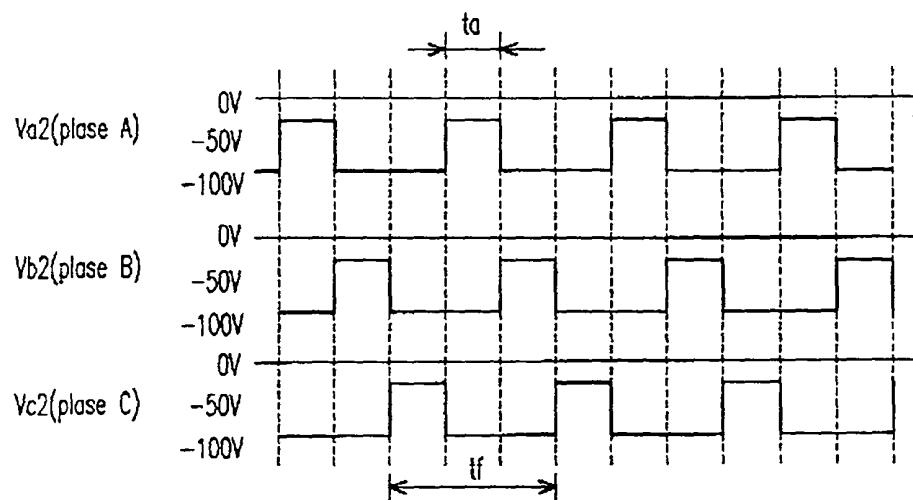


FIG. 47

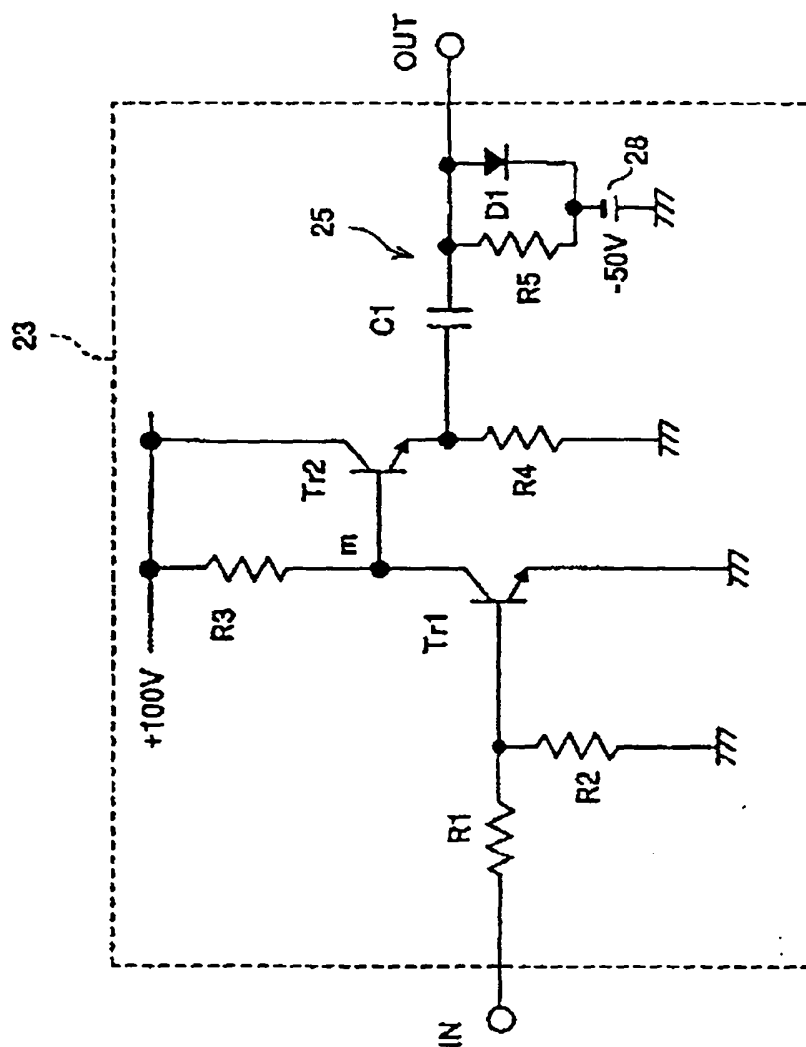


FIG. 48

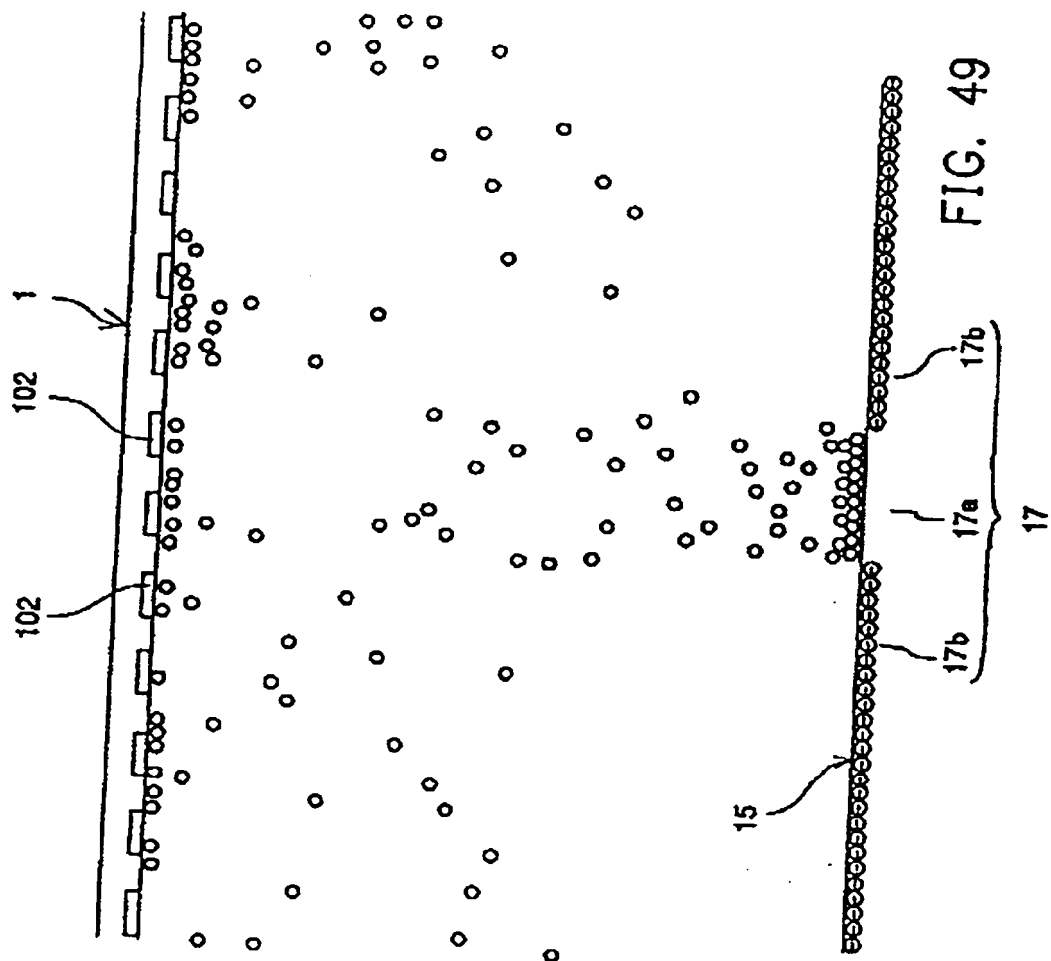


FIG. 49

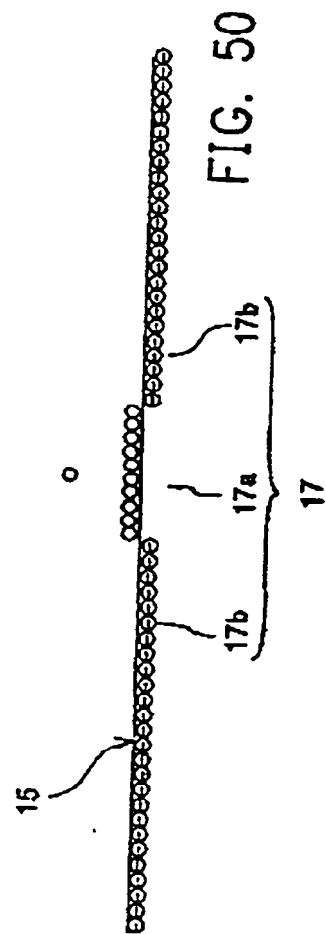
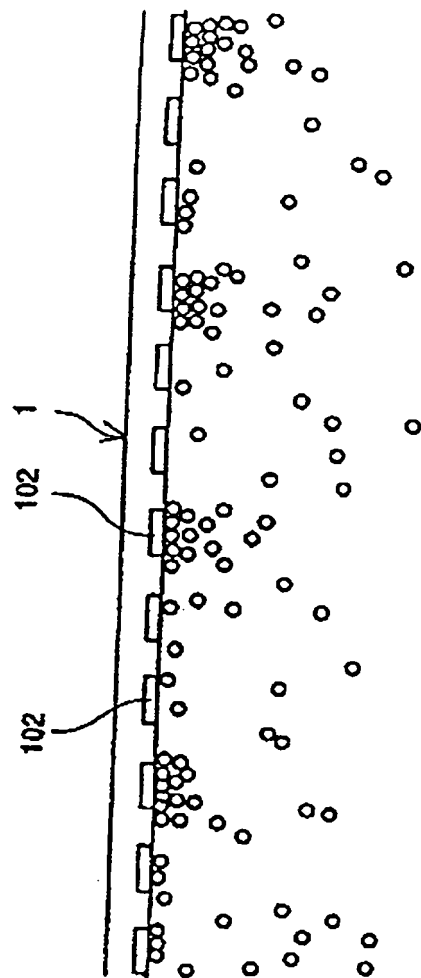


FIG. 50

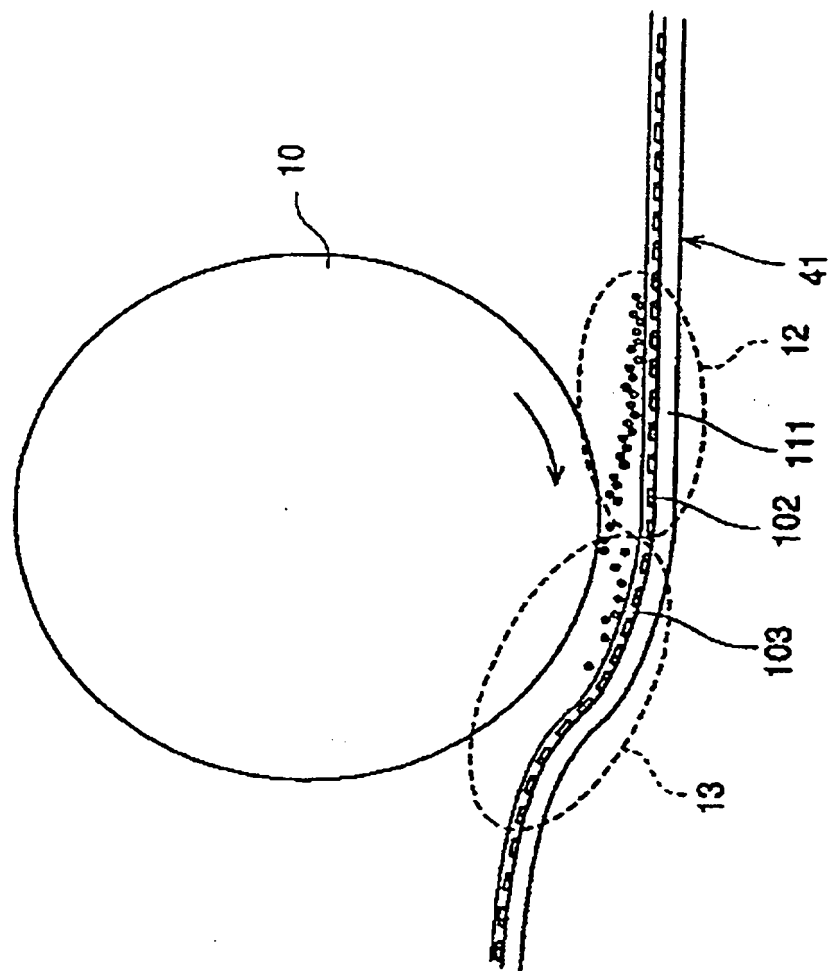


FIG. 51

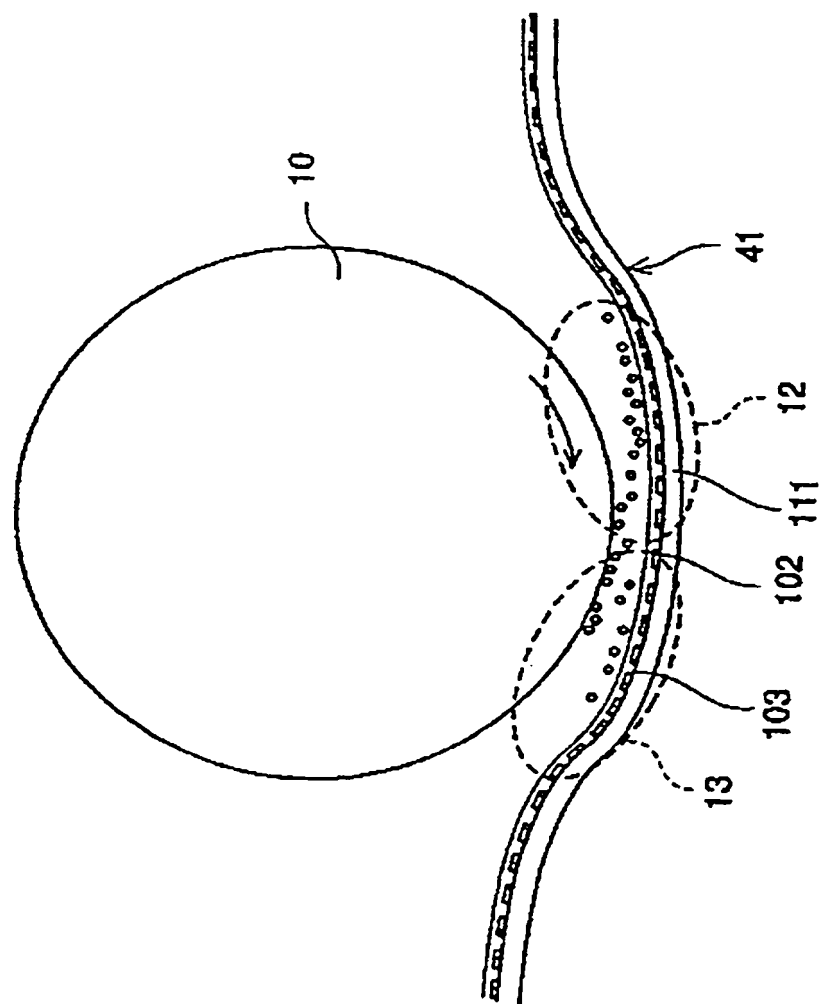


FIG. 52

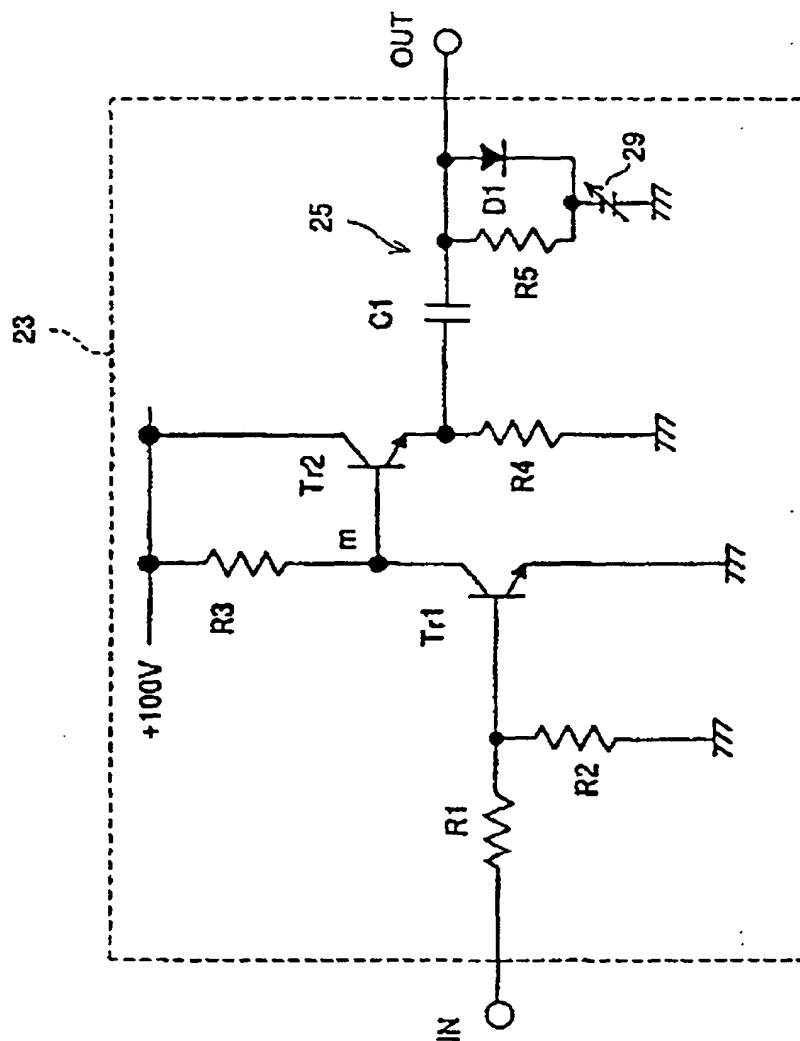


FIG. 53

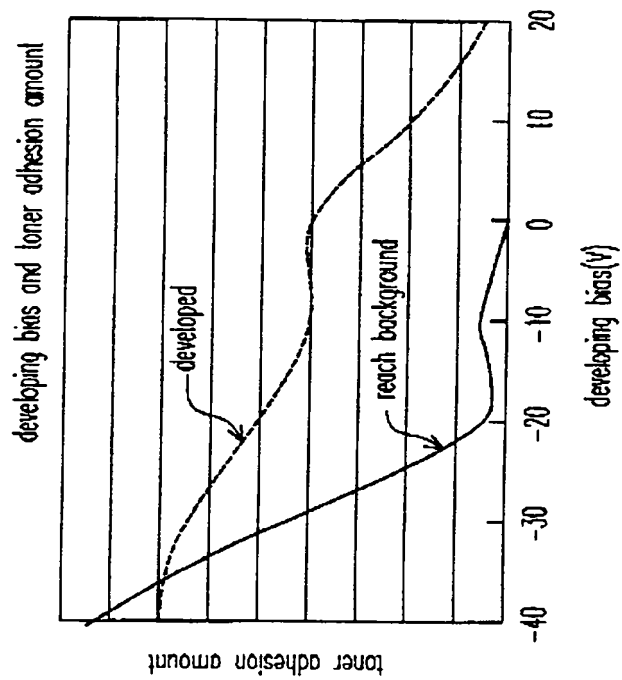
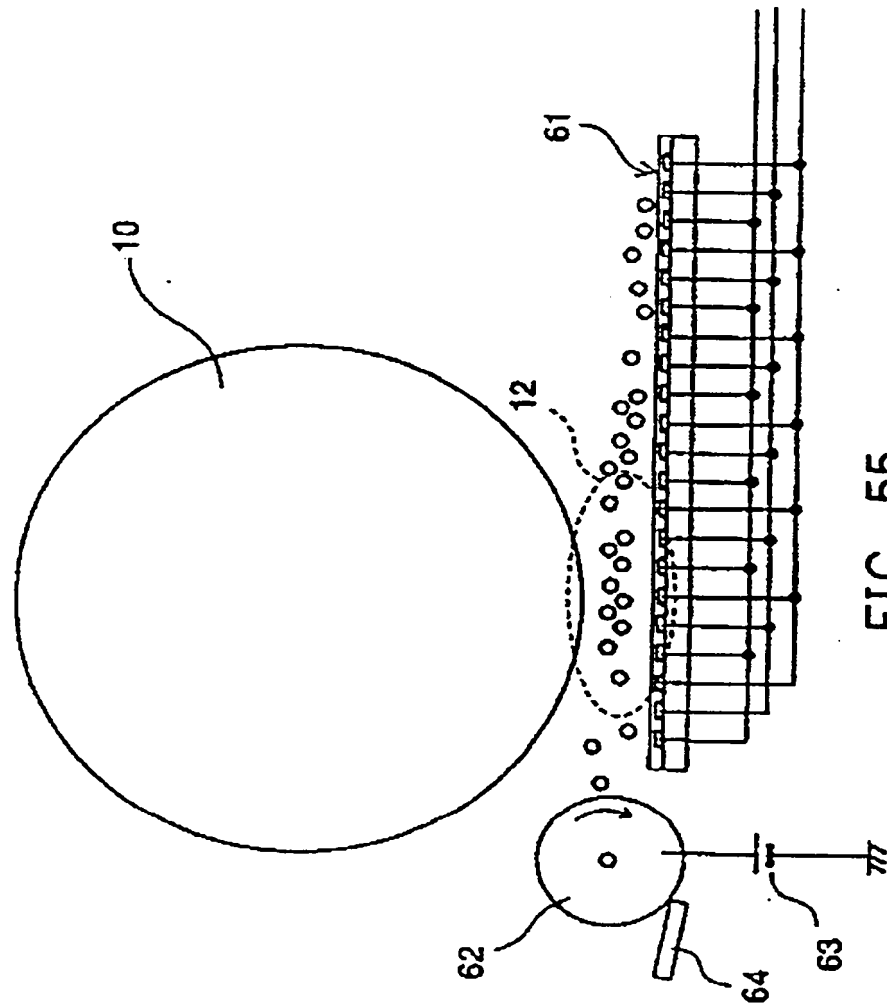


FIG. 54



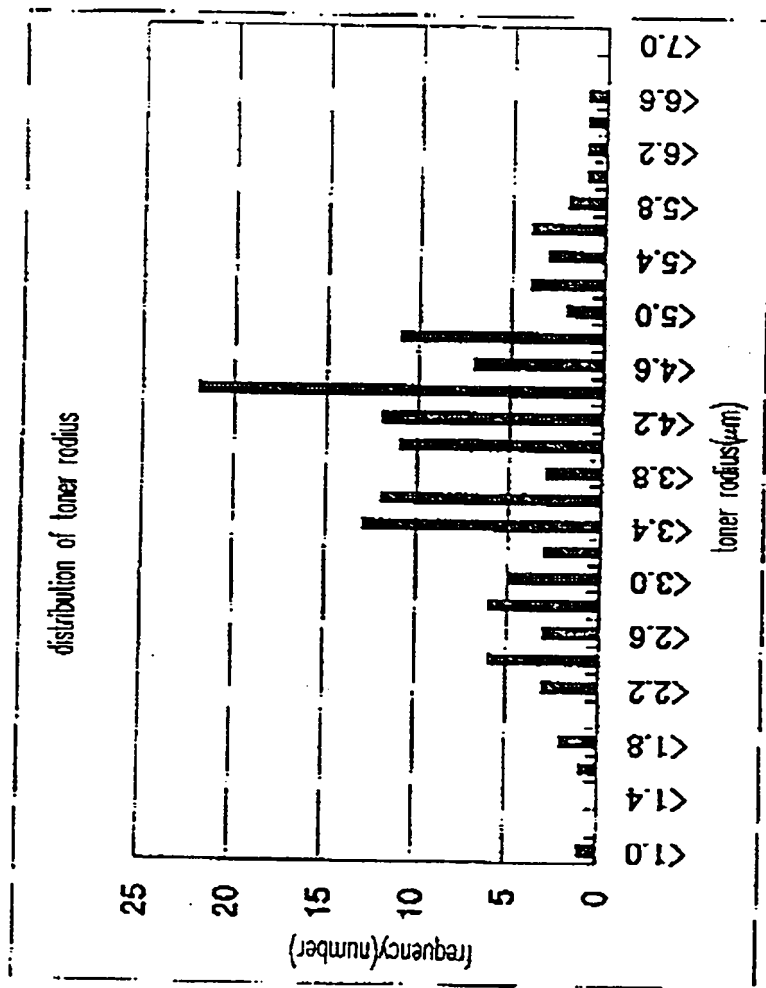


FIG. 56

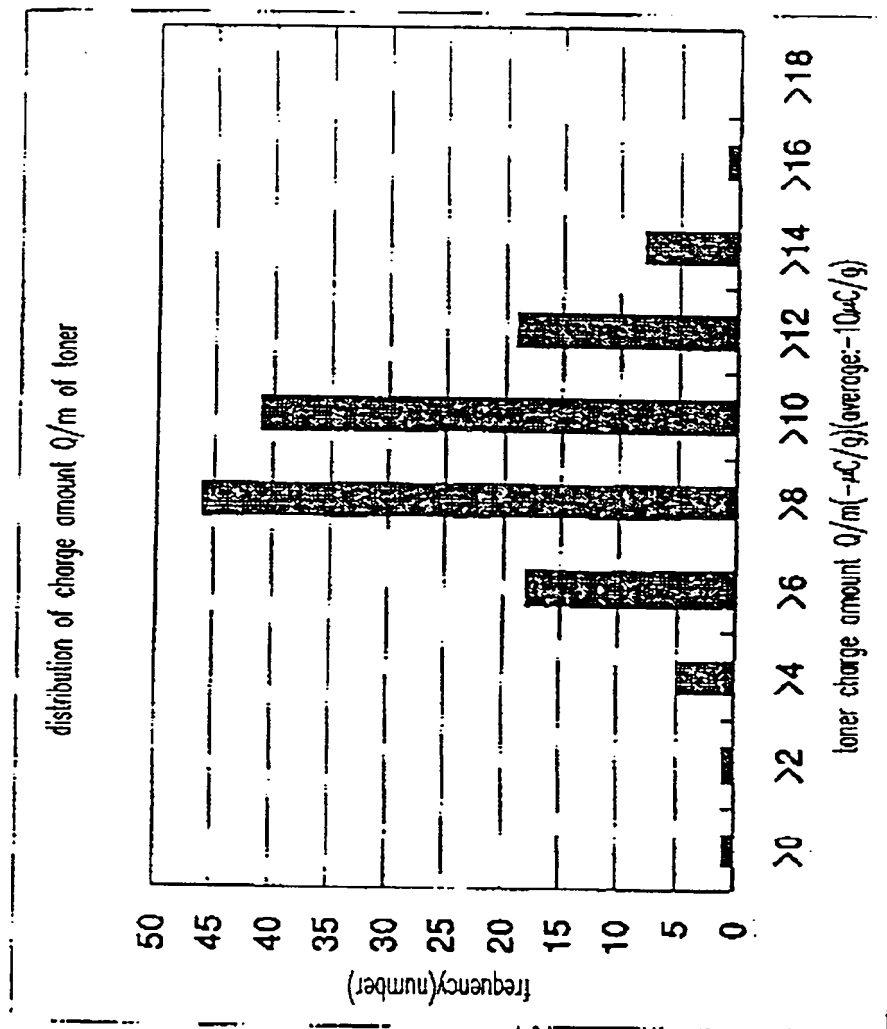
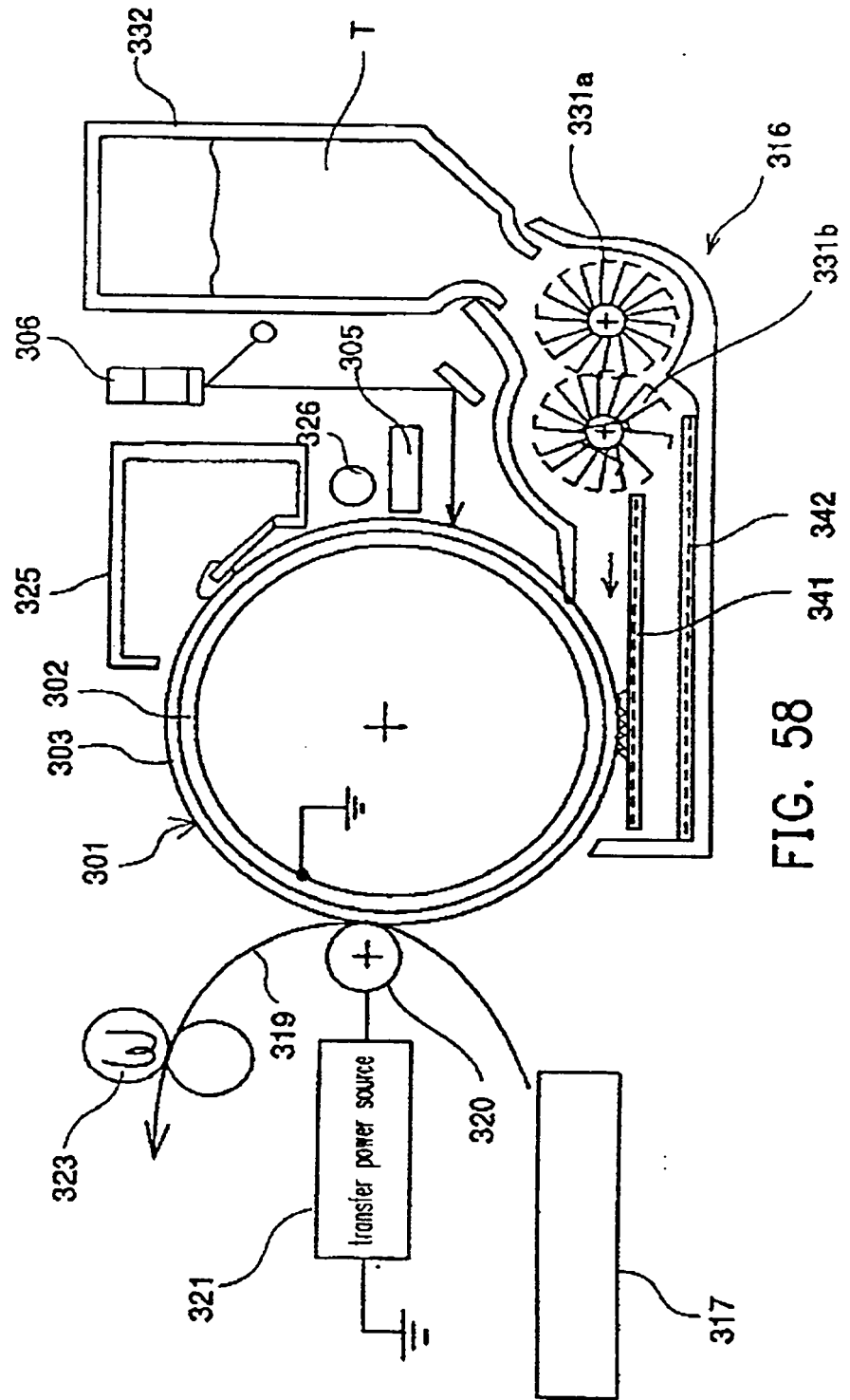


FIG. 57



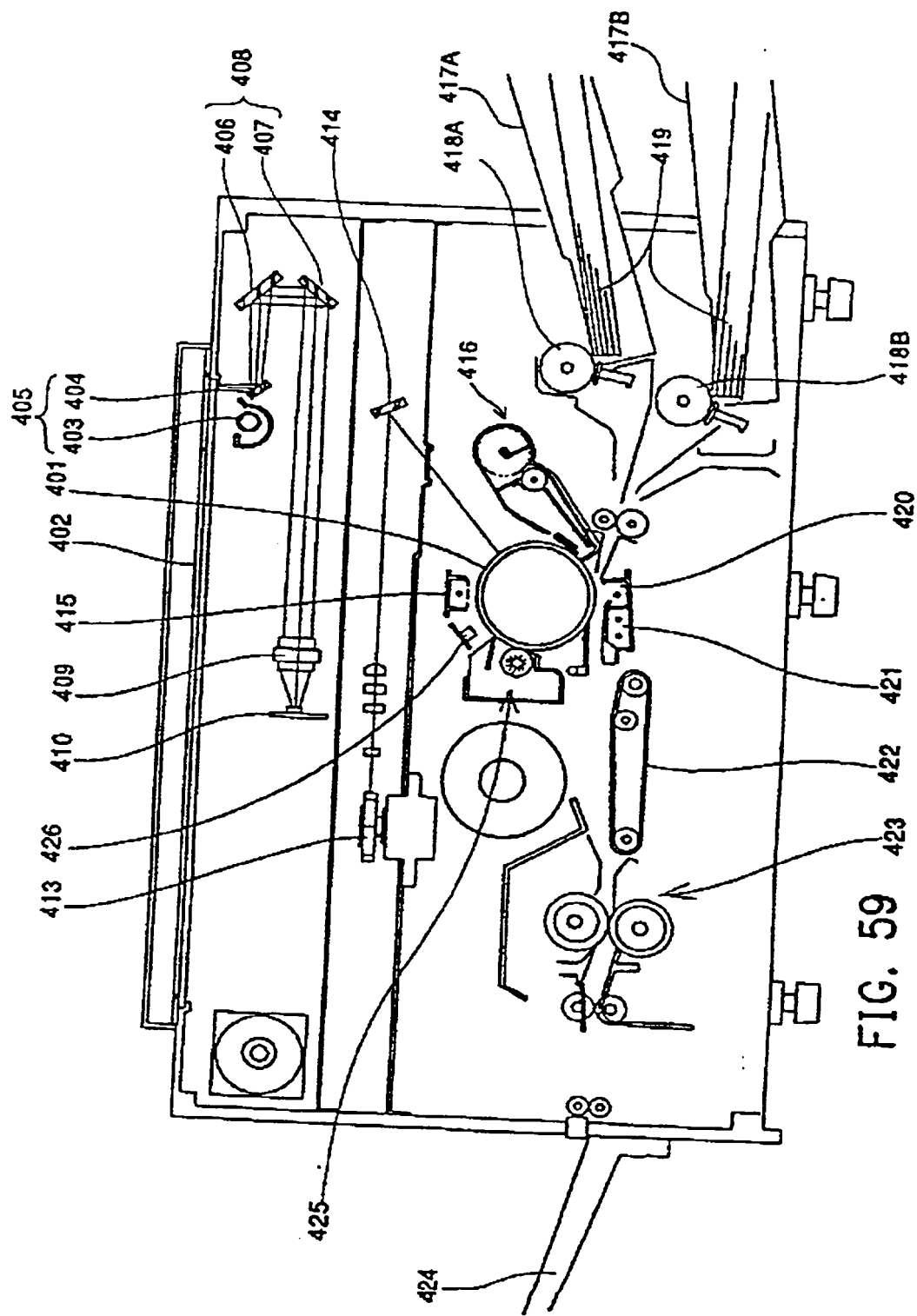


FIG. 59

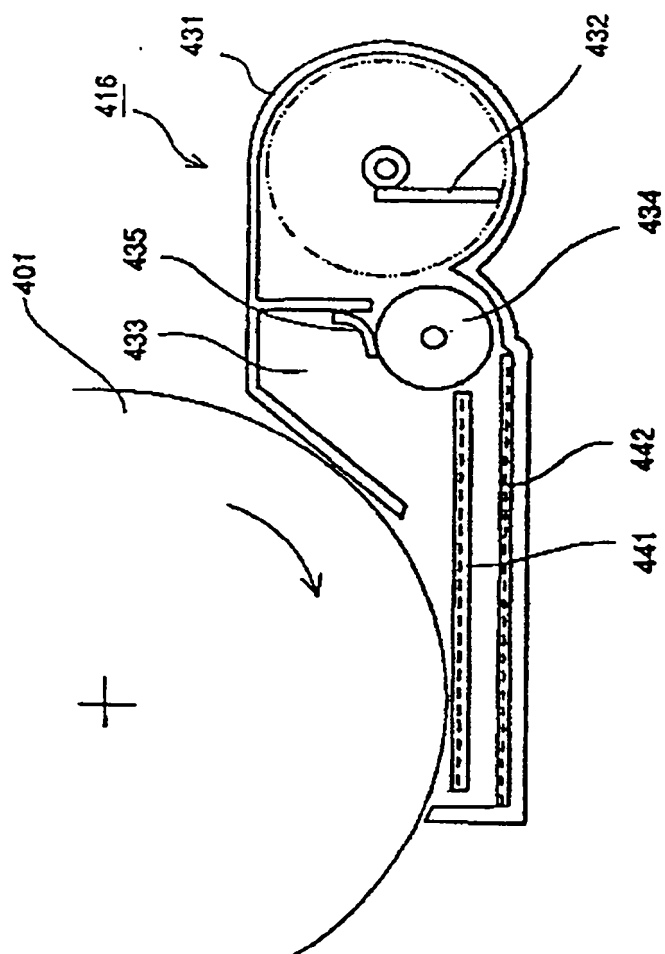


FIG. 60

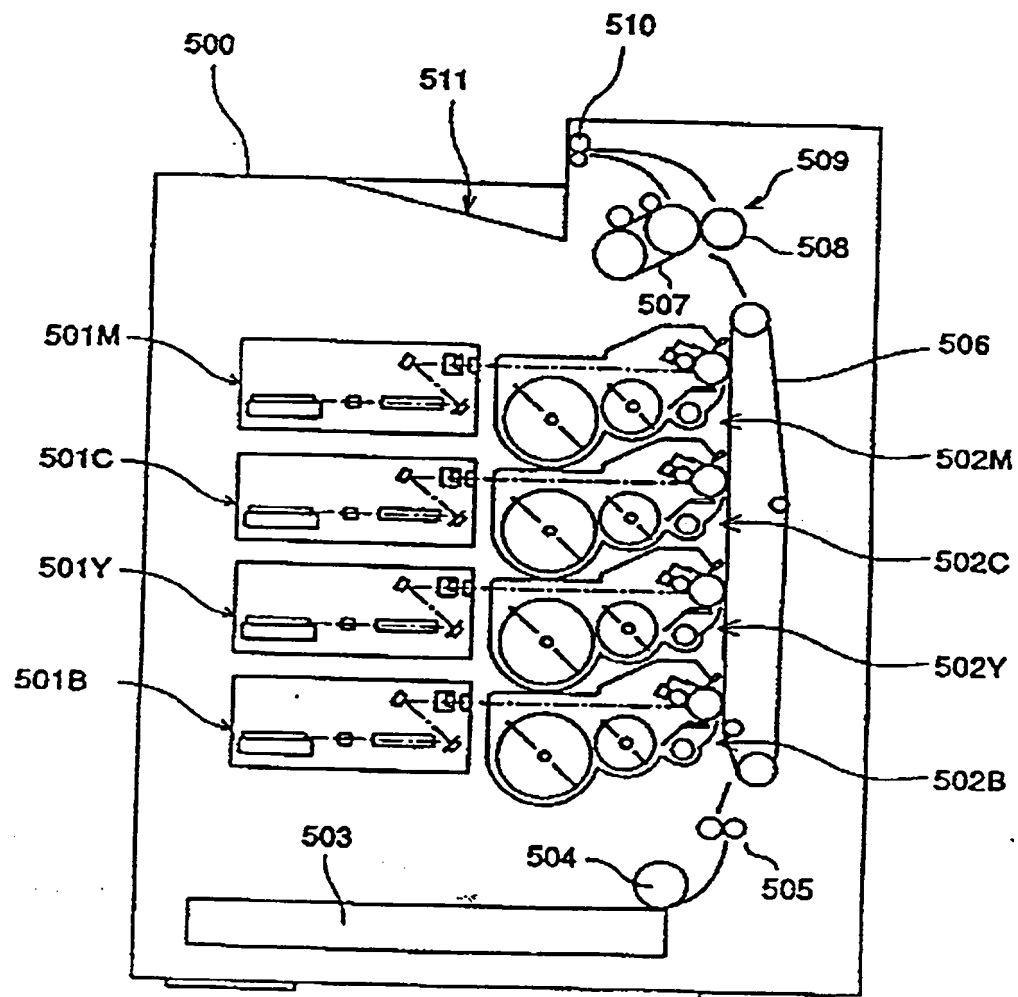


FIG. 61

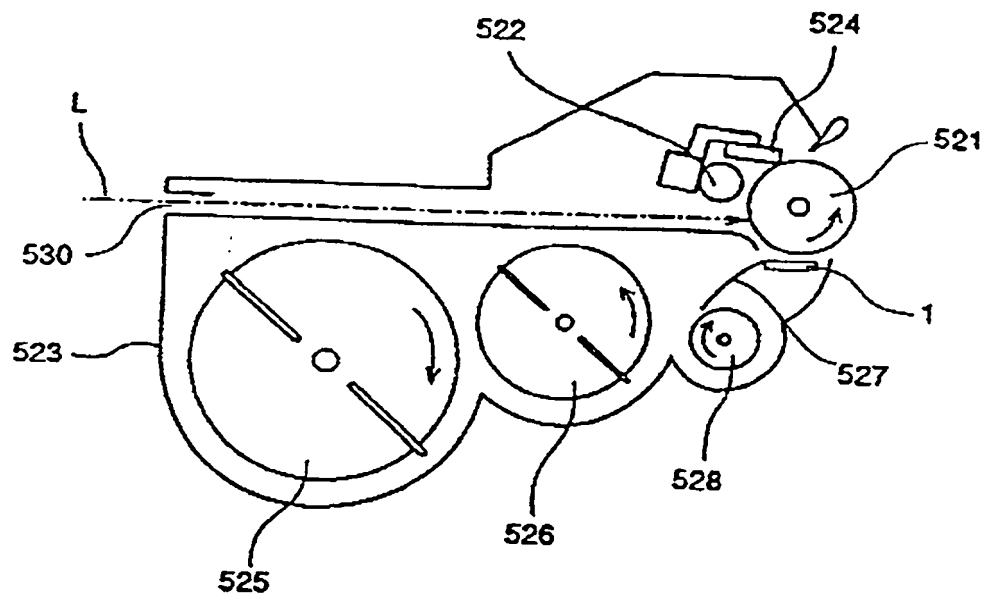


FIG. 62

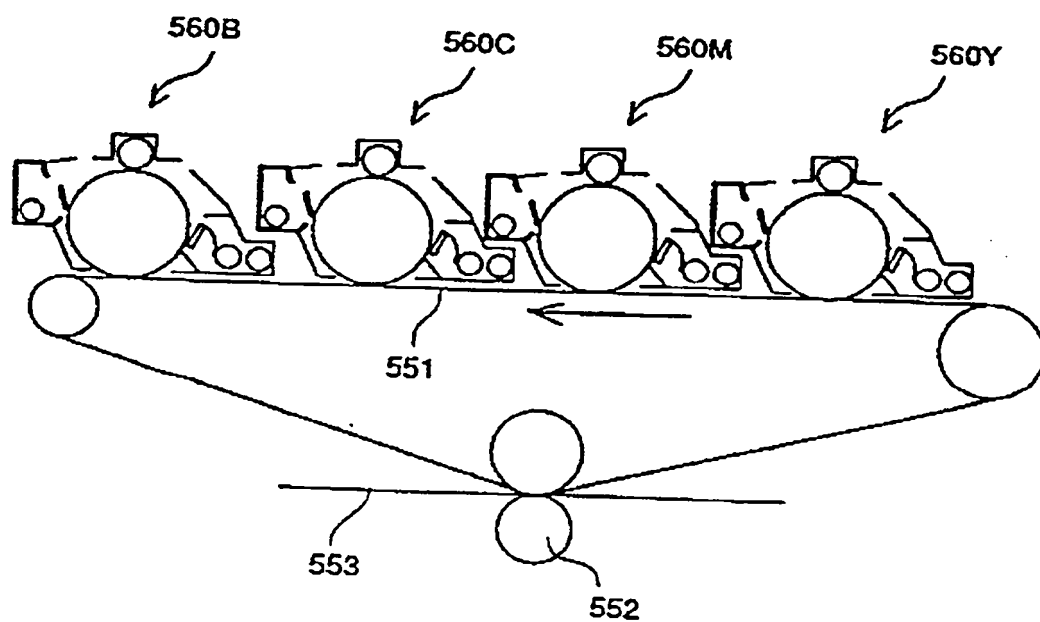


FIG. 63

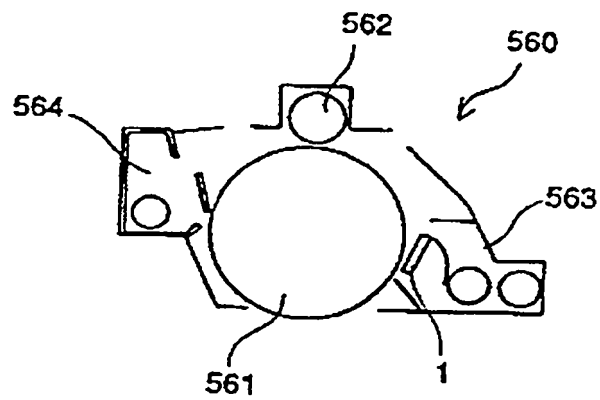


FIG. 64

5 WHAT IS CLAIMED IS:

1. A classifier for classifying a powder comprising:

a transfer member which has a plurality of electrodes for generating electric fields and which is configured to transport said powder while transferring and hopping said powder by an electrostatic force; and

10 an opposite member configured to selectively catch particles of said powder transferred and hopped by the transfer member, the opposite member being arranged in a position substantially opposite to the transfer member.

2. The classifier of claim1, wherein said opposite member is an opposite transfer member which has a plurality of electrodes for generating
15 electric fields and which is configured to for transfer said powder by an electrostatic force.

3. The classifier of claim 2, wherein part or the whole of said opposite transfer member is inclined position against said transfer member.

4. The classifier of claim1, wherein said opposite member is a
20 rotary roller member.

5. The classifier of claim1, wherein said opposite member is a rotary belt member.

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5 6. The classifier of claim 5, wherein said belt member is inclined
against said transfer member.

7. The classifier of claim 1, wherein said opposite member
comprises electrode wires.

8. The classifier of claim 1, wherein said opposite member
10 comprises an array of electrode wires.

9. The classifier of claim 8, wherein a voltage for generating
electric fields is applied to each of the electrode wires.

10. The classifier of claim 7, wherein said each of the electrode
wires is covered with a protective layer.

15 11. The classifier of claim 7, further comprising a slit member
having slit holes arranged between the electrode wires, which are arranged
at a position substantially opposite to said transfer member, and the
transfer member.

12. The classifier of claim 1, wherein said opposite member
20 comprises a slit member having slit holes; and

electrodes formed on wall surfaces of the slit holes.

13. The classifier of claim 1, wherein a width of each of said

5 electrodes of said transfer member in a transporting direction of said powder is 1 to 20 times an average grain diameter of said powder, and each space between said electrodes in the transporting direction of said powder is 1 to 20 times the average grain diameter of said powder, wherein drive waveforms of n phases are applied to each of the plurality of electrodes,
10 wherein n represents an integer not less than 3.

14. The classifier of claim 1, wherein said transfer member has an inorganic or organic surface protective layer covering said plurality of electrodes, and wherein a thickness of the surface protective layer is not more than 10 μ m.

15 15. The classifier of claim 1, wherein the classifier has a plurality of said opposite members, and the plurality of said opposite members selectively catch the particles of said powder depending on a quantity of charge or a mass of the particles of said powder.

16. A classifier for classifying powder, in which the classifier
20 transports said powder while transferring and hopping the powder by an electrostatic force, comprising a member configured to selectively catch particles of said powder transferred and hopped by forming an electric field.

5 17. A developer, comprising:

 a classifier configured to classify a powder; and

 a developing means for developing a latent image on a latent image carrier the classified powder to form a visual image on the latent image carrier, and

10 wherein said classifier is the classifier of claim 1.

 18. The developer of claim 17, wherein said developing means comprises a developing roller facing to said latent image carrier.

 19. The developer of claim 18, wherein said developing roller also functions as said opposite member.

15 20. The developer of claim 17, wherein said developing means is a member having a plurality of electrodes for generating electric fields for transferring and hopping the powder by an electrostatic force at a position near said latent image carrier.

 21. The developer of claim 20, wherein said member having a
20 plurality of electrodes also functions as said opposite member.

 22. The developer of claim 17, wherein said developer means comprises a rotary belt facing to said latent image carrier.

5 23. The developer of claim 22, wherein said rotary belt member
also functions as said opposite member.

 24. An image forming apparatus, comprising:

a latent image carrier; and

a developer configured to develop a latent image with a powder,
10 wherein the developer is the developer of claim 17.

5

ABSTRACT OF THE INVENTION

A classifier having a simple constitution for classifying powder with a high accuracy is provided. The classifier is provided with a transfer board having a plurality of electrodes for generating electric fields for transferring and hopping the powder by an electrostatic force. The classifier is further provided with an opposite roller generating an electric field for transporting and attaching the powder (toner) transferred and hopped on the transfer board to the opposite roller, which is opposite to the transfer board.



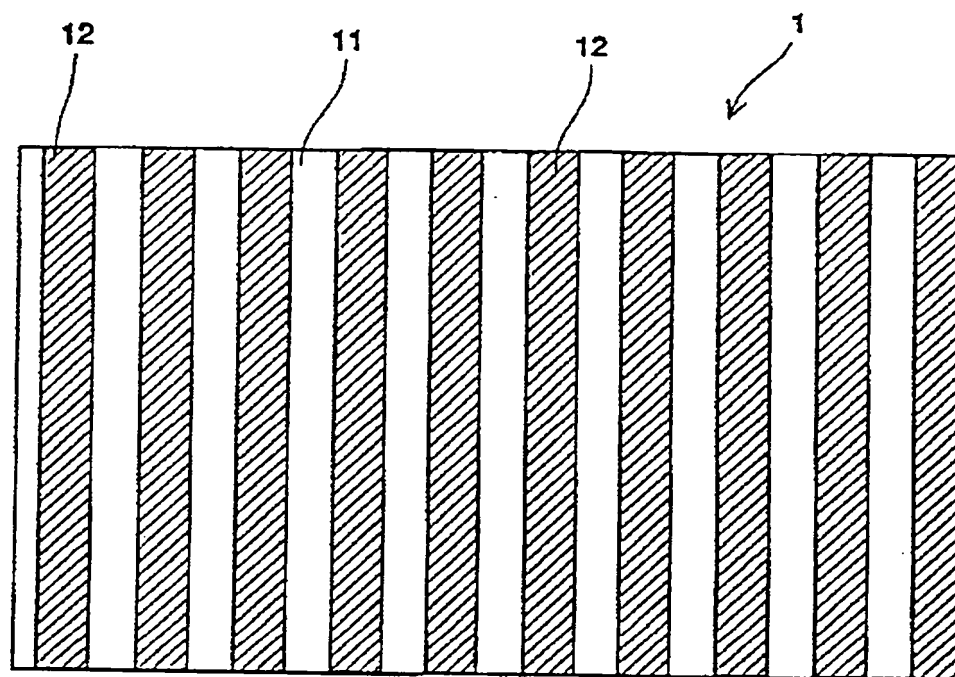


FIG. 3

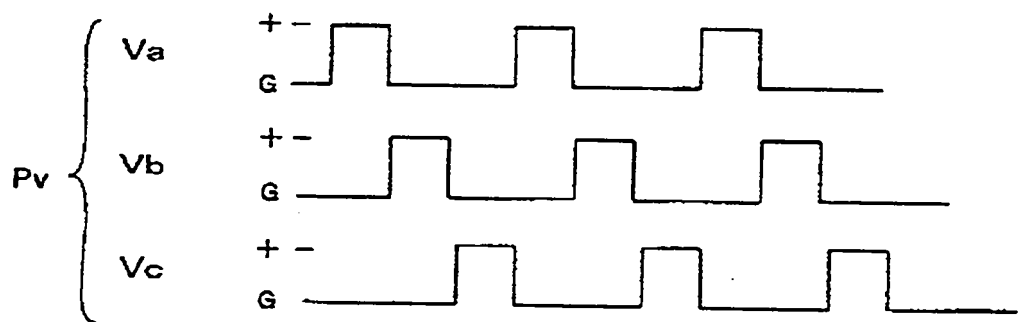


FIG. 4

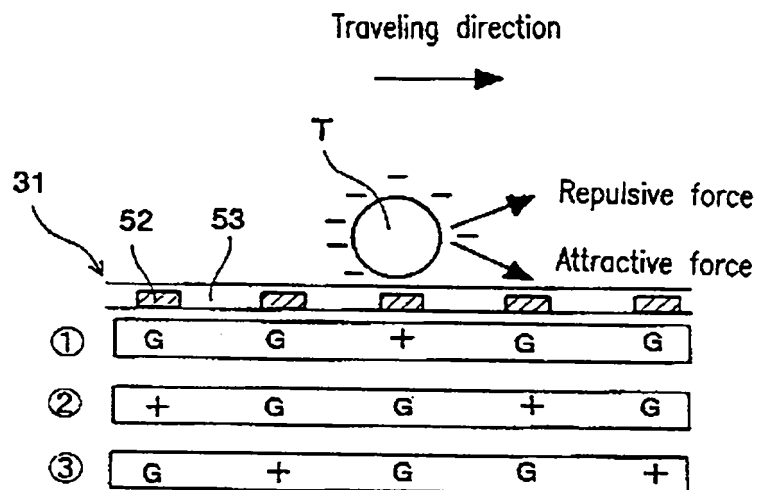


FIG. 5

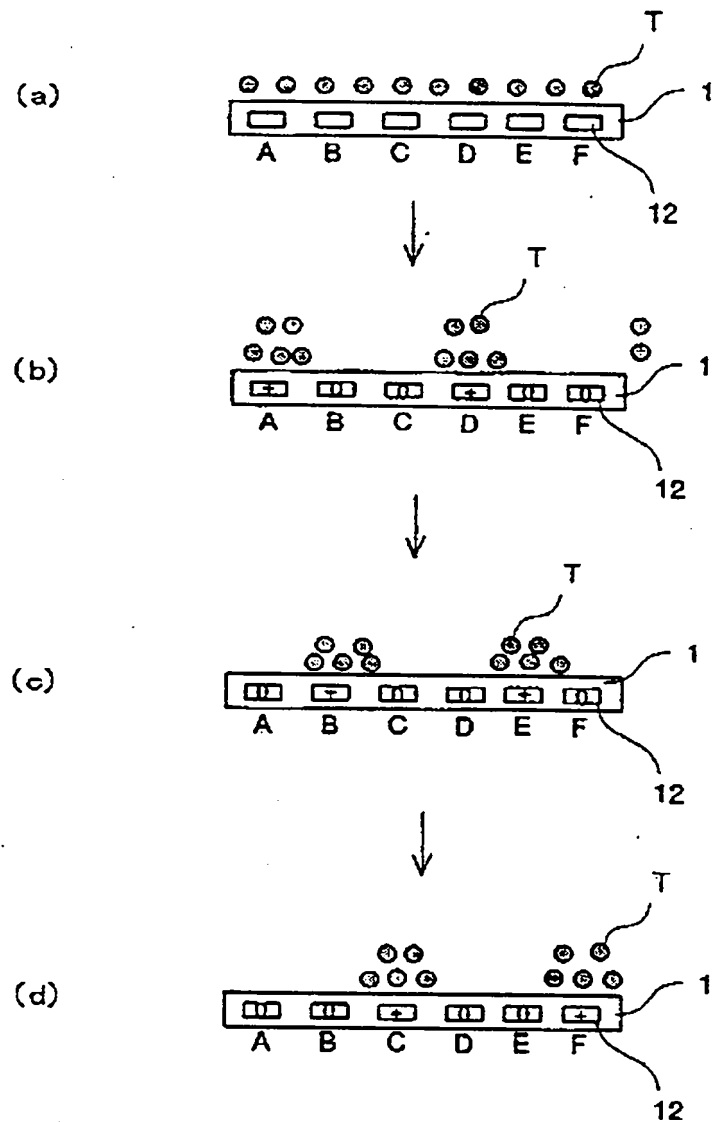


FIG. 6

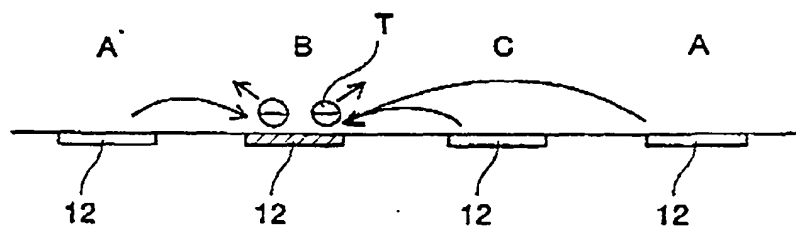


FIG. 7

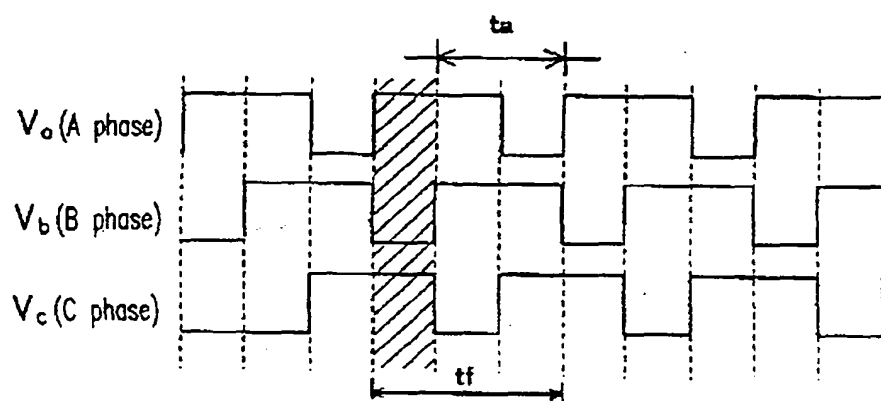


FIG. 8

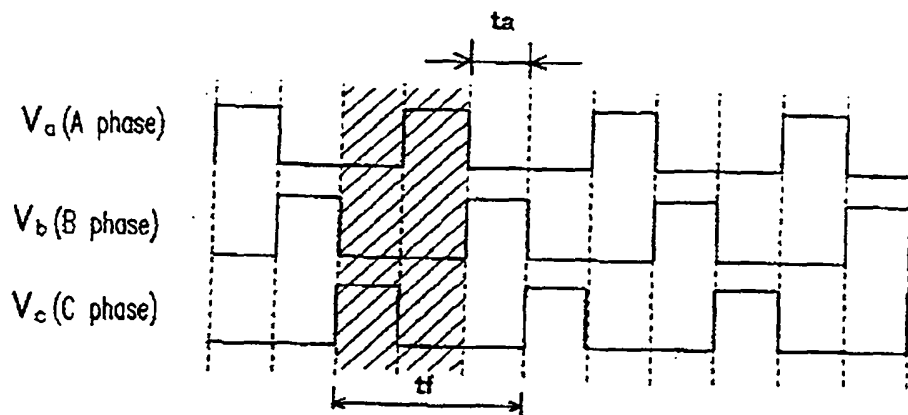


FIG. 9

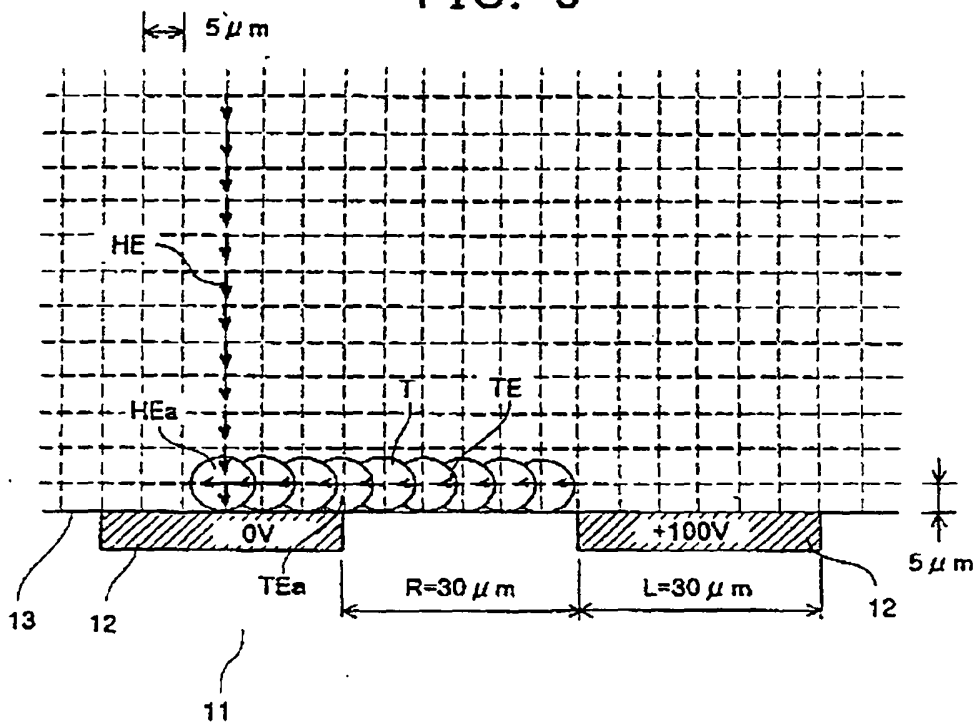


FIG. 10

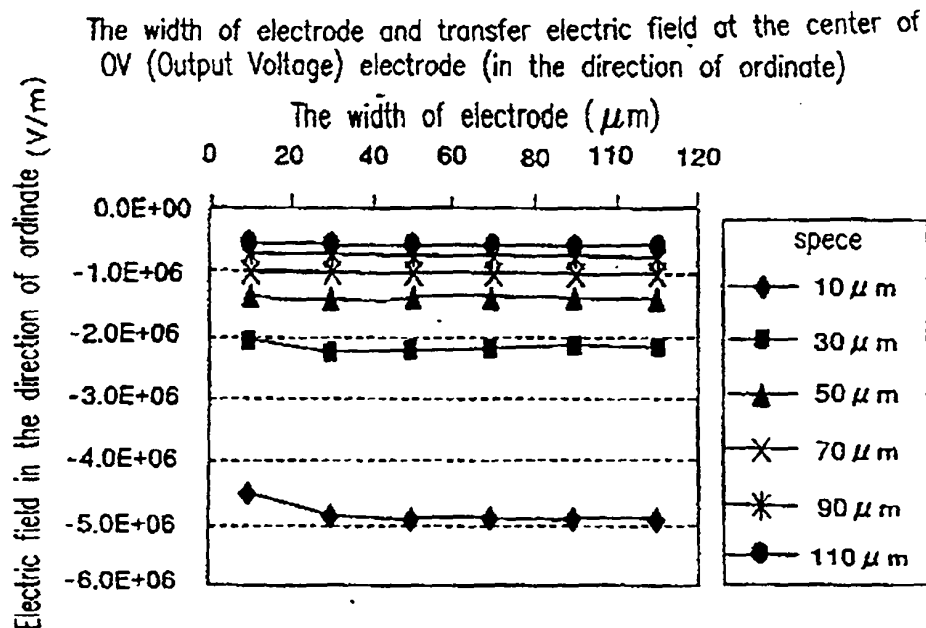


FIG. 11

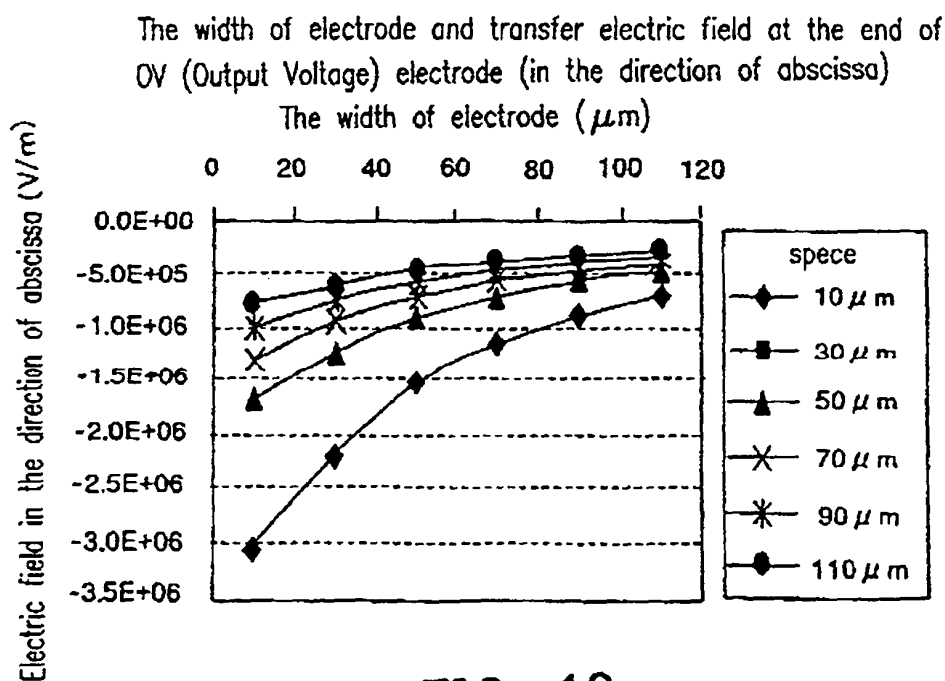


FIG. 12

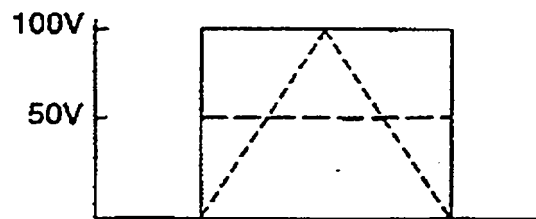


FIG. 13

Horizontal distance traveled from an initial position in $160 \mu\text{sec}$

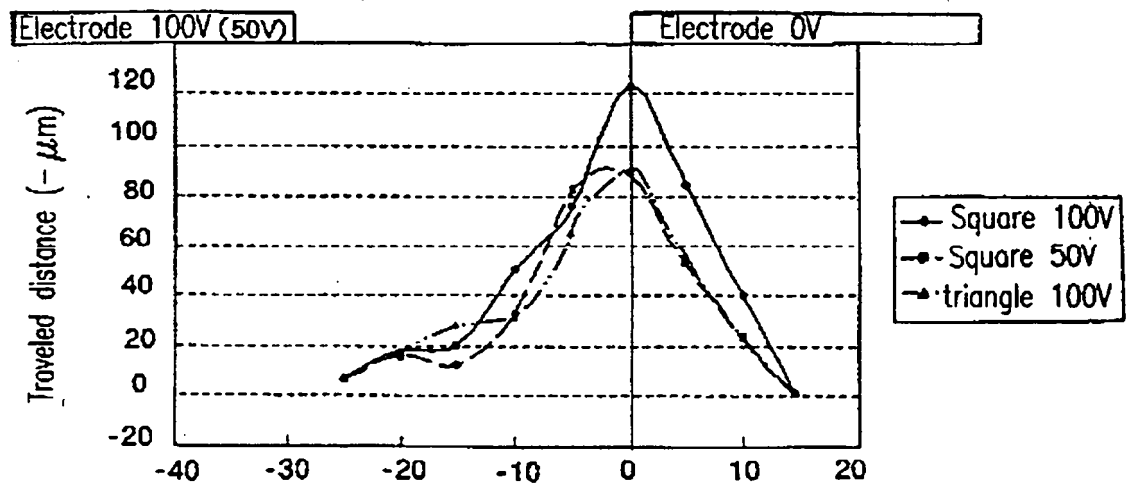


FIG. 14

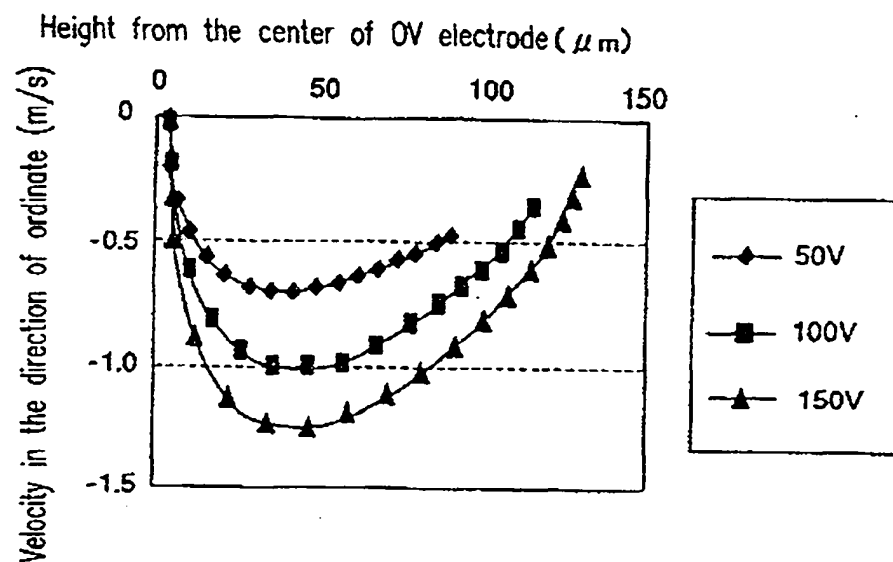


FIG. 15

Protective layer film and transfer electric field

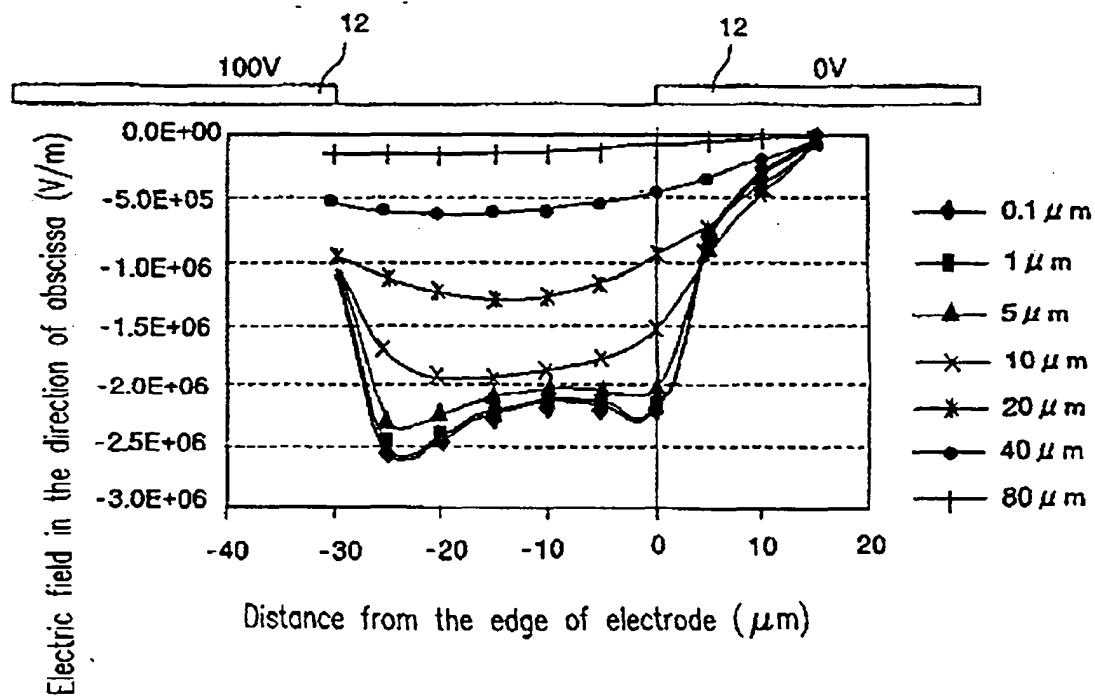


FIG. 16

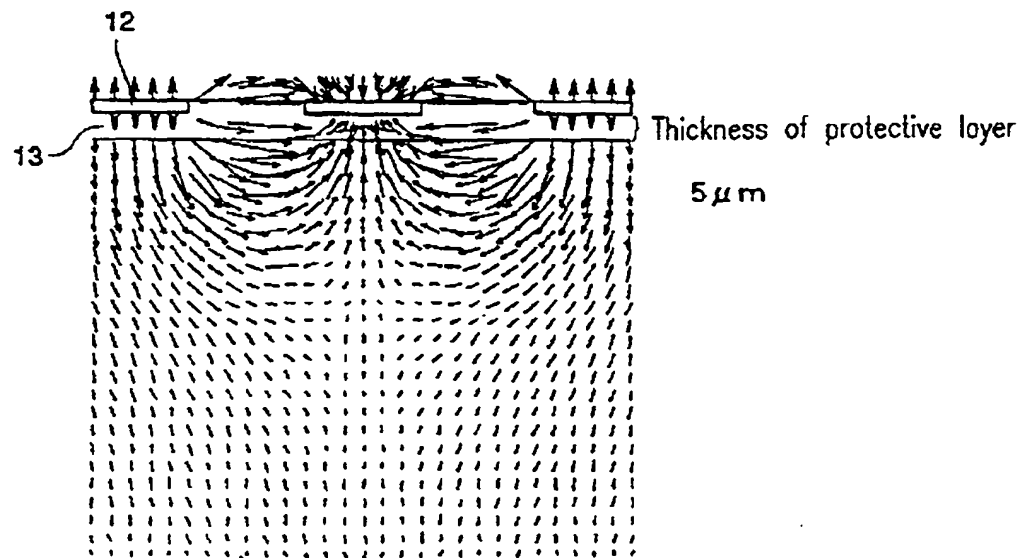


FIG. 17

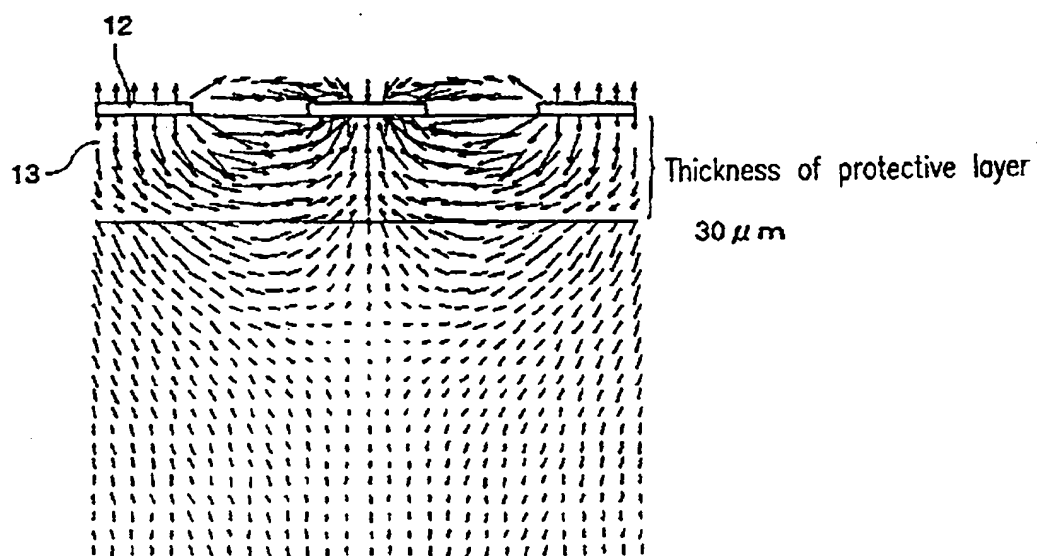


FIG. 18



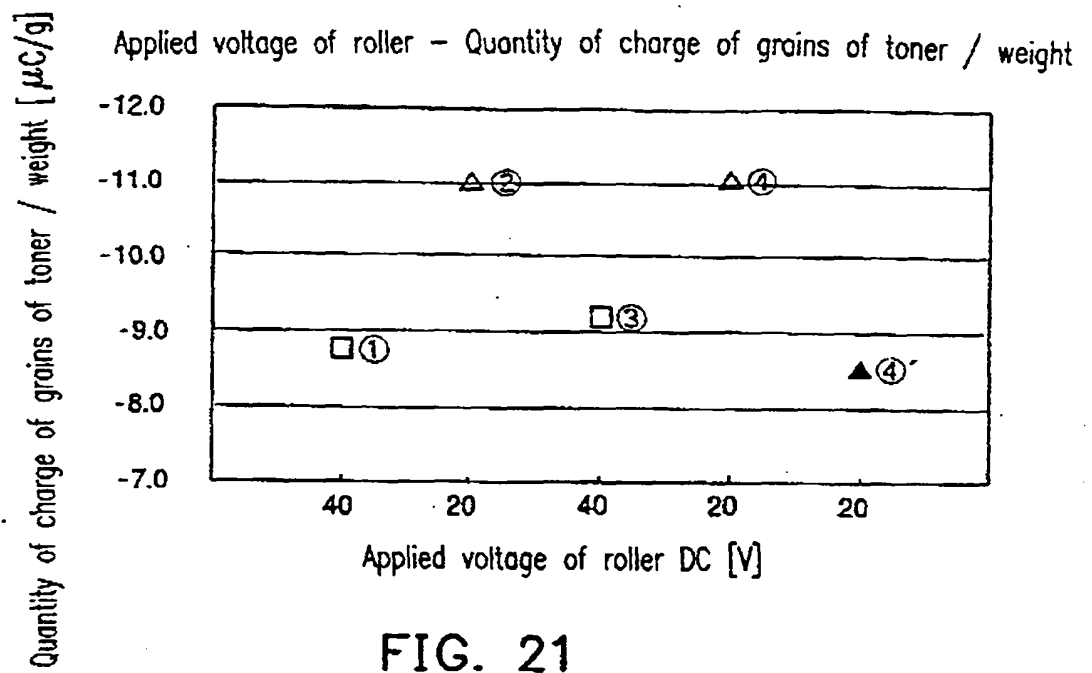


FIG. 21

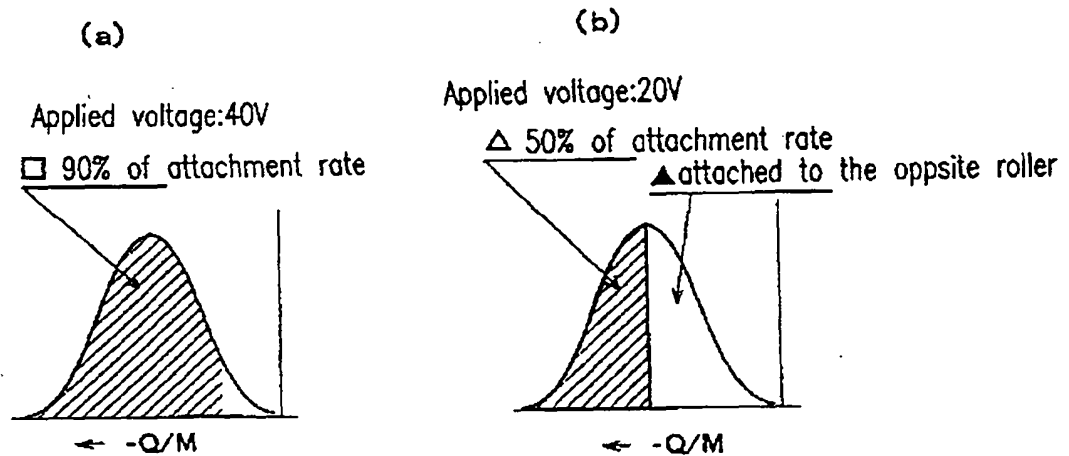


FIG. 22

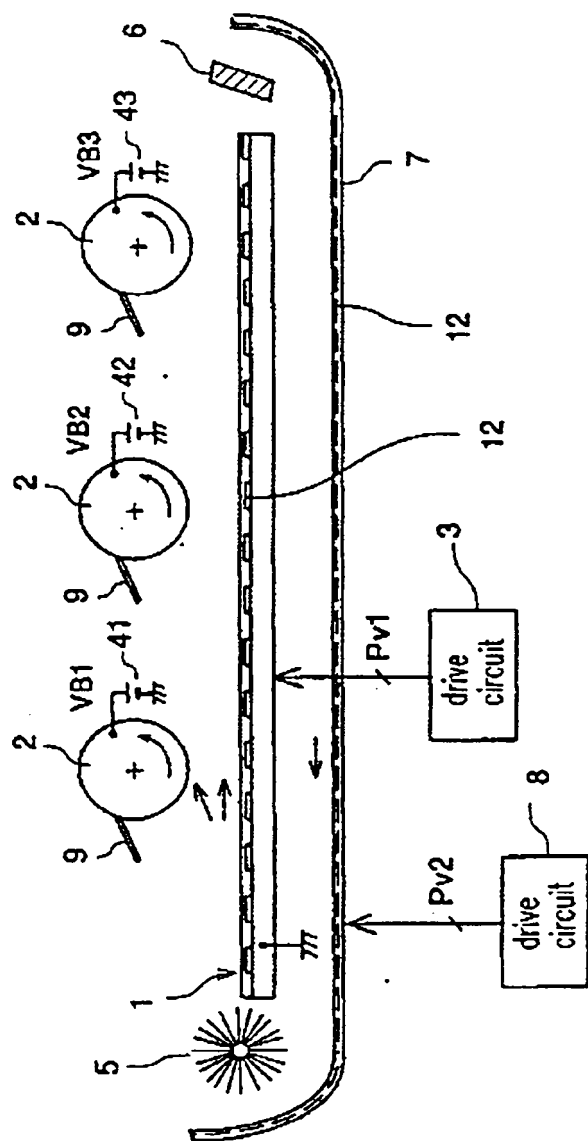


FIG. 23

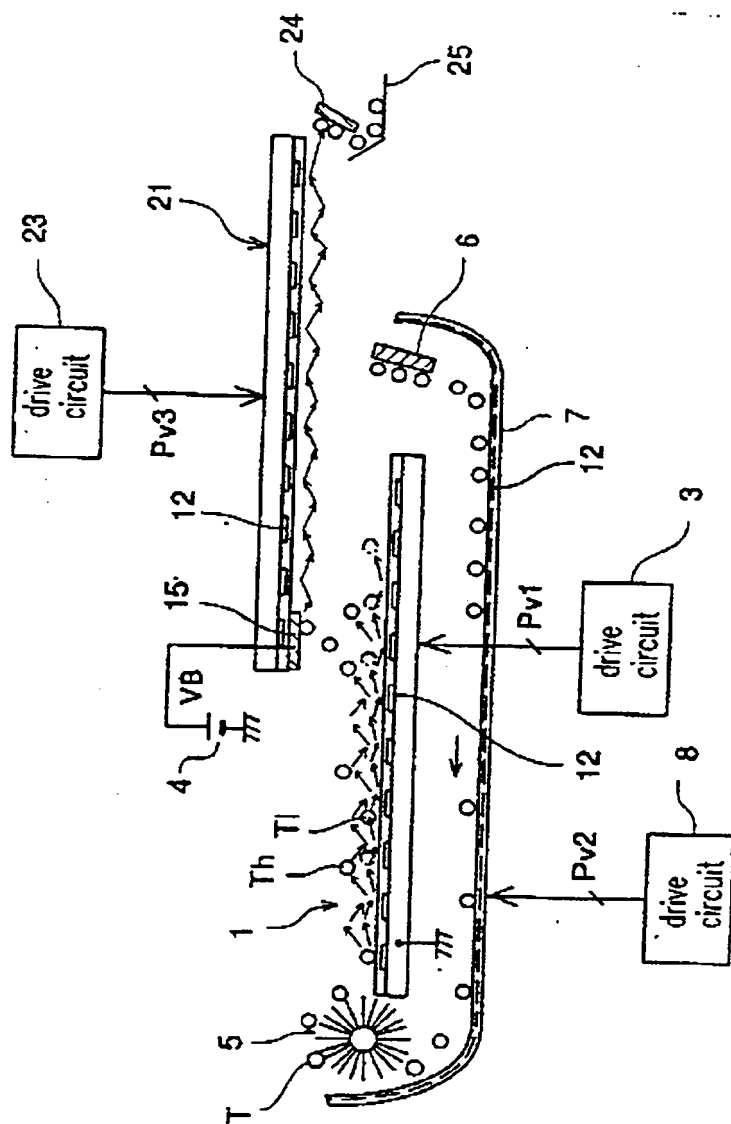


FIG. 24

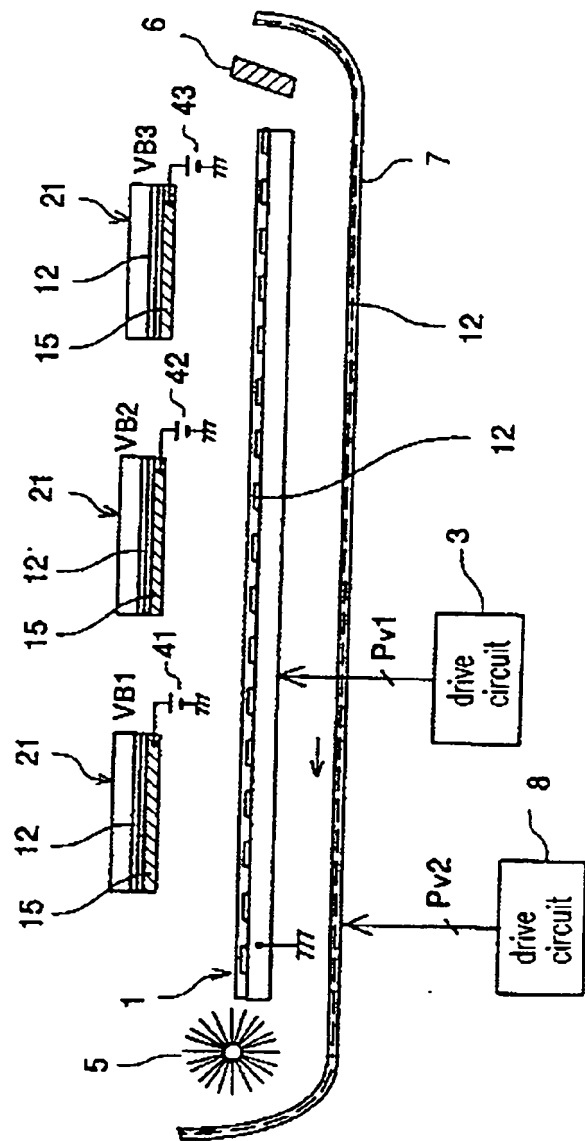


FIG. 25

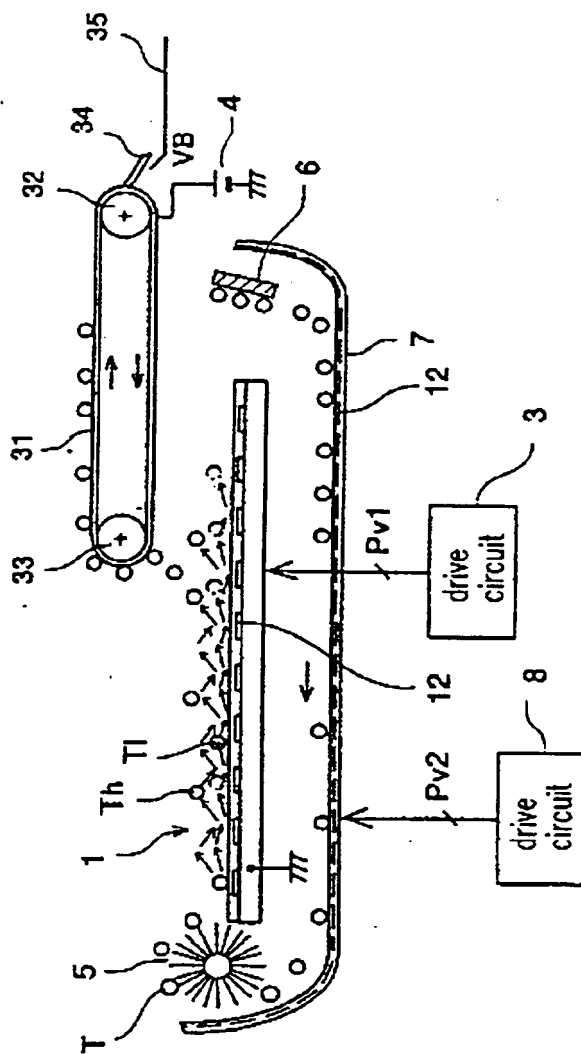


FIG. 26

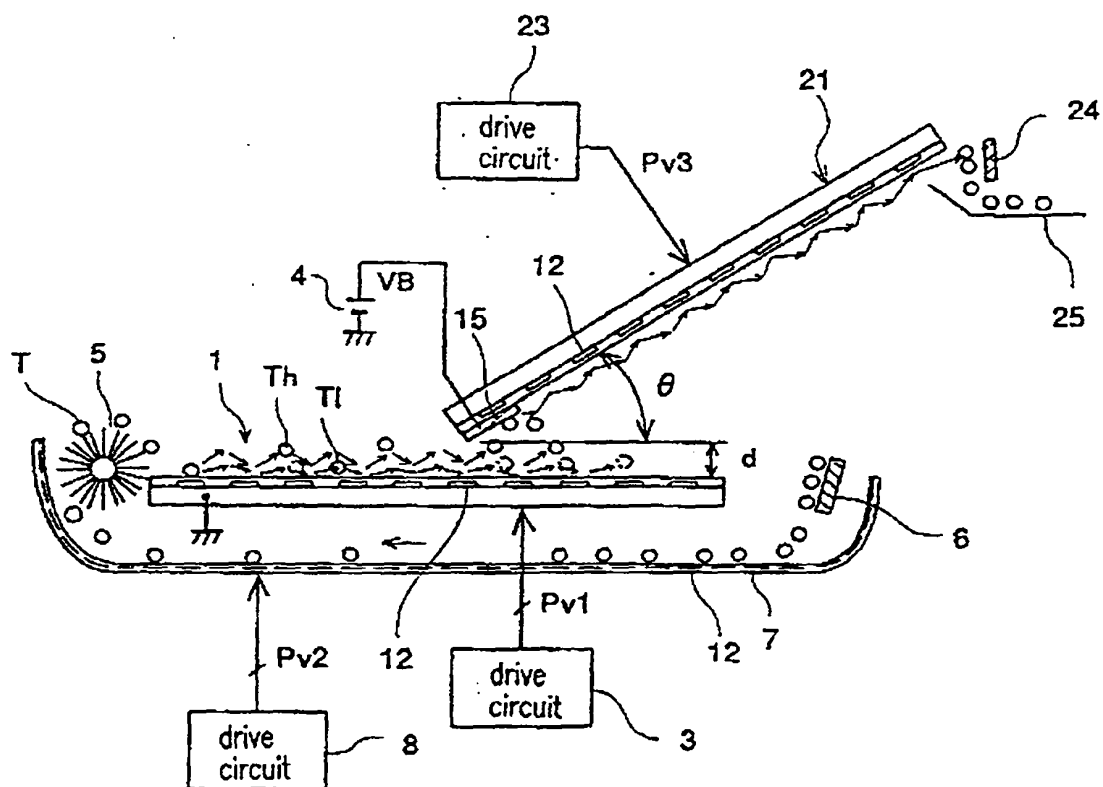
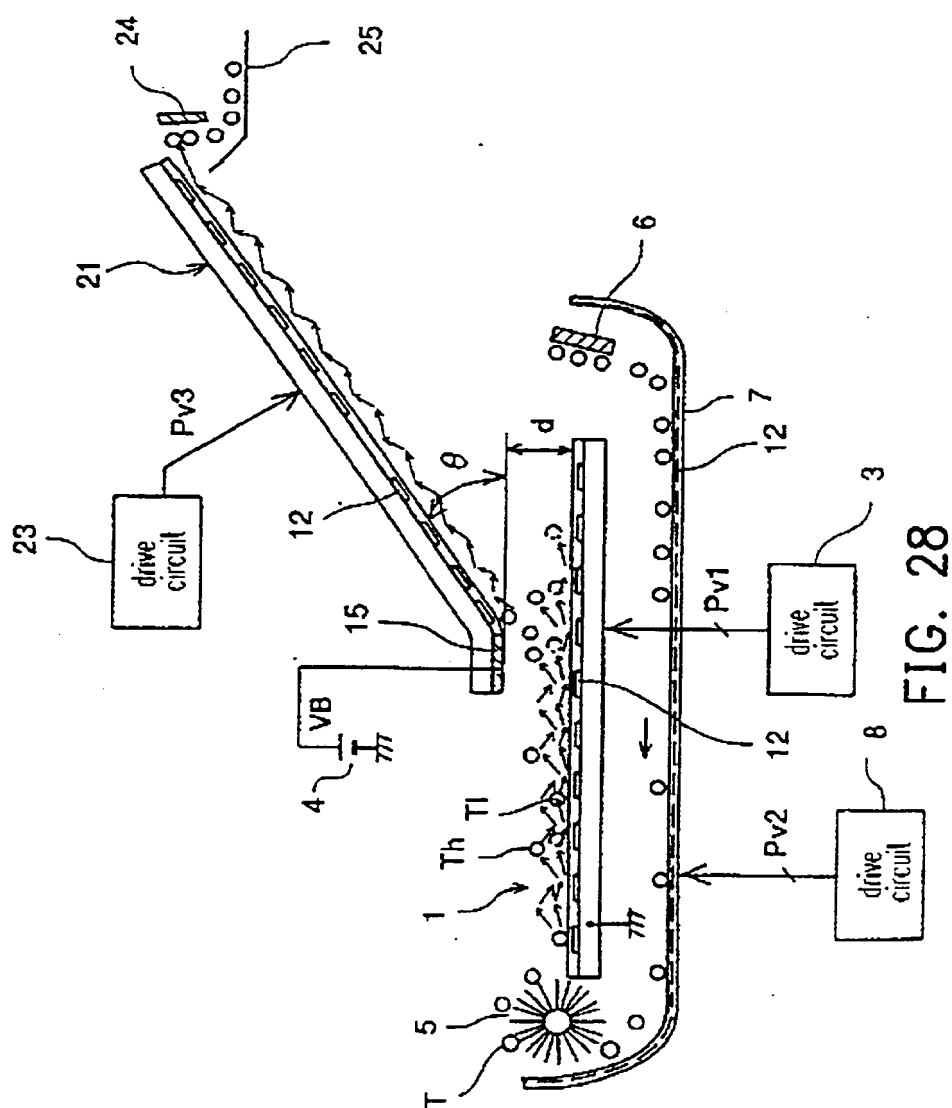


FIG. 27



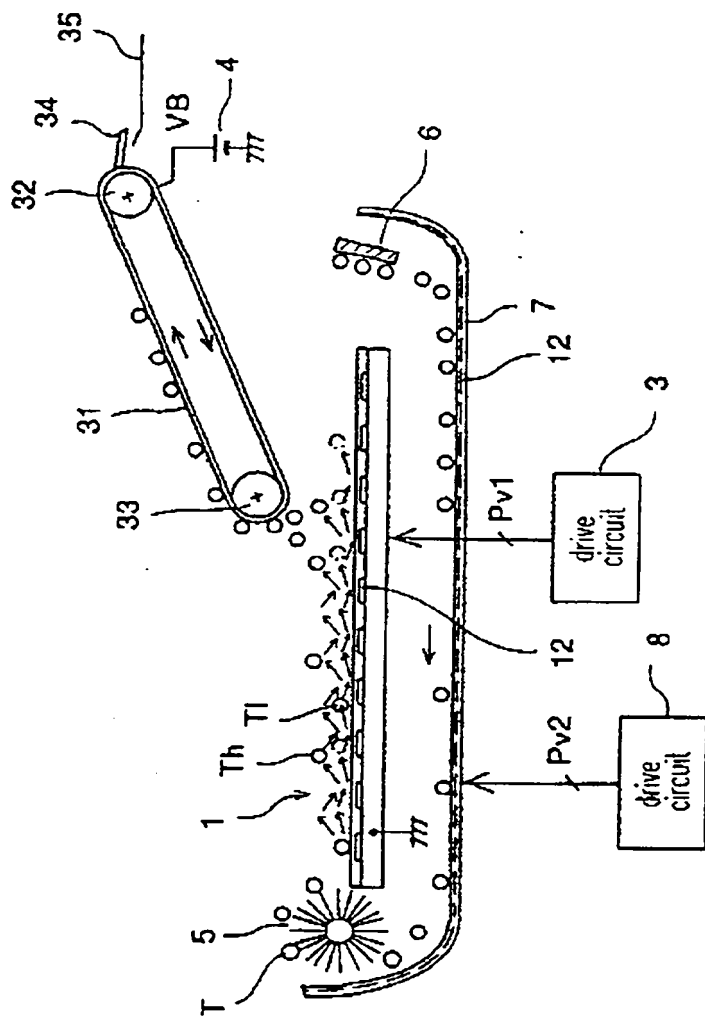


FIG. 29

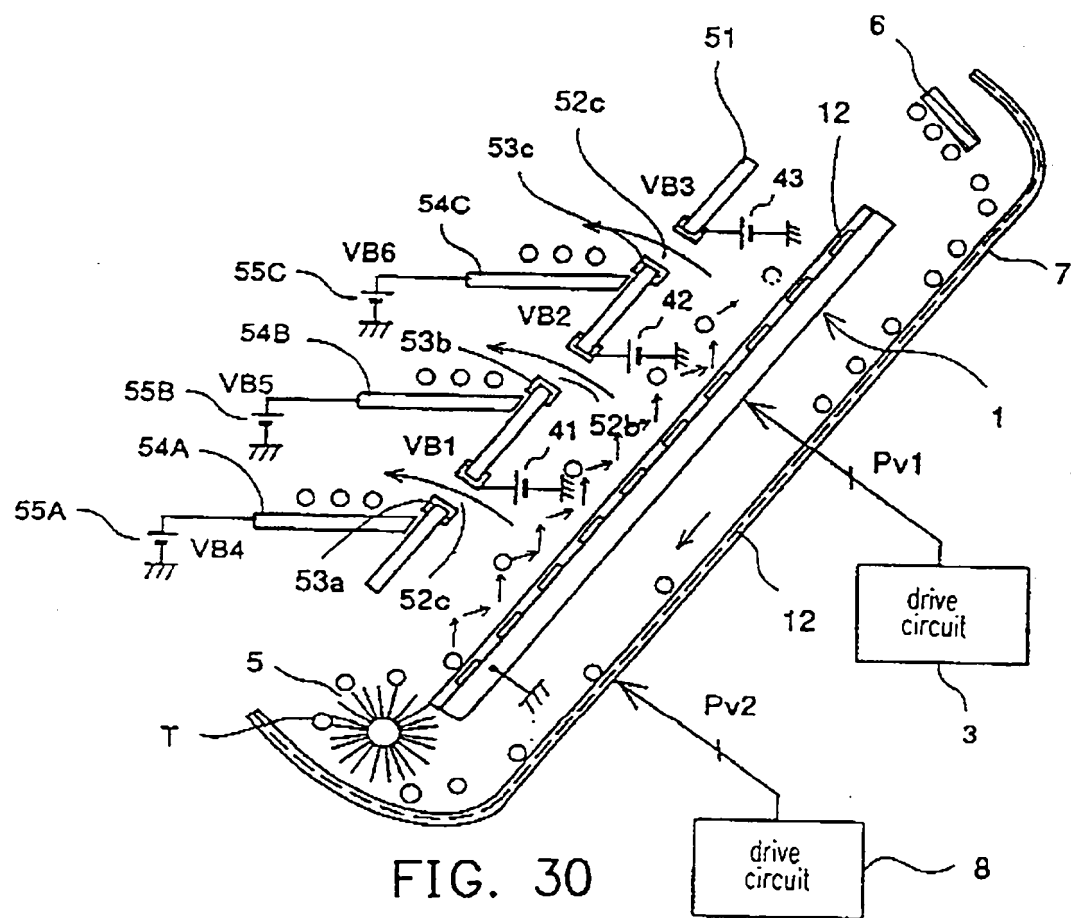


FIG. 30

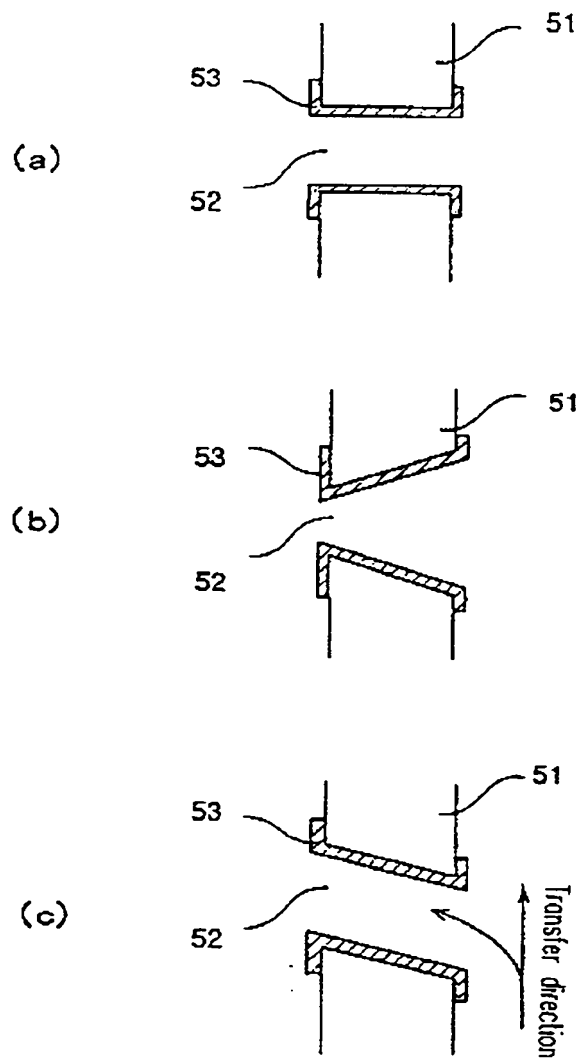


FIG. 31

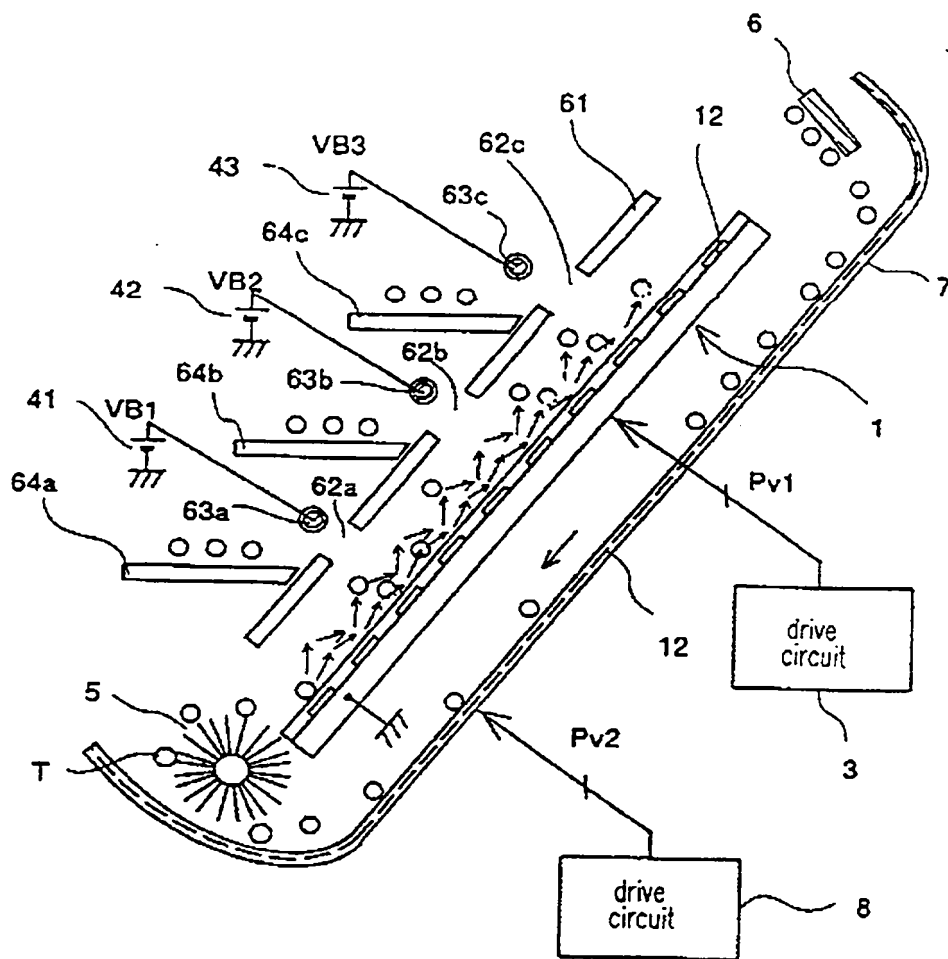


FIG. 32

(a)

(b)

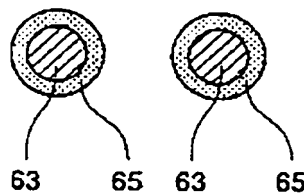
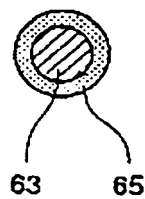


FIG. 33

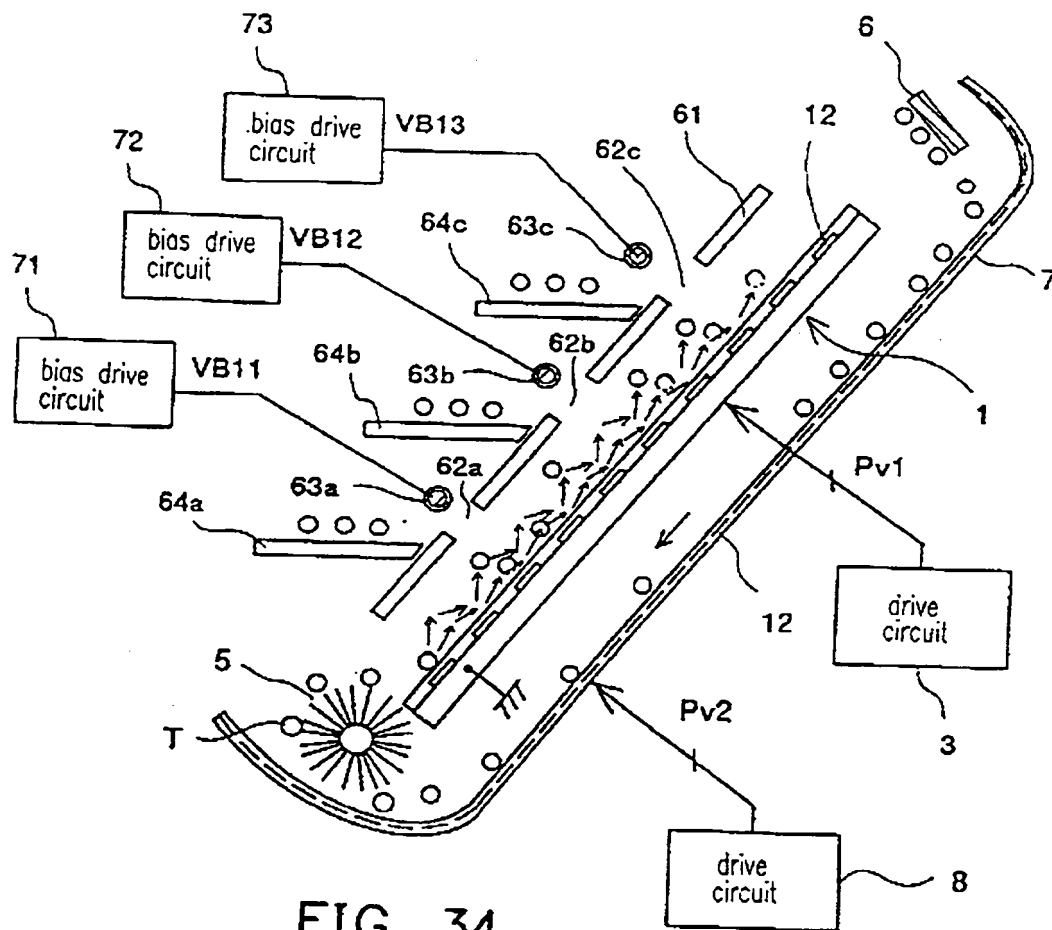


FIG. 34

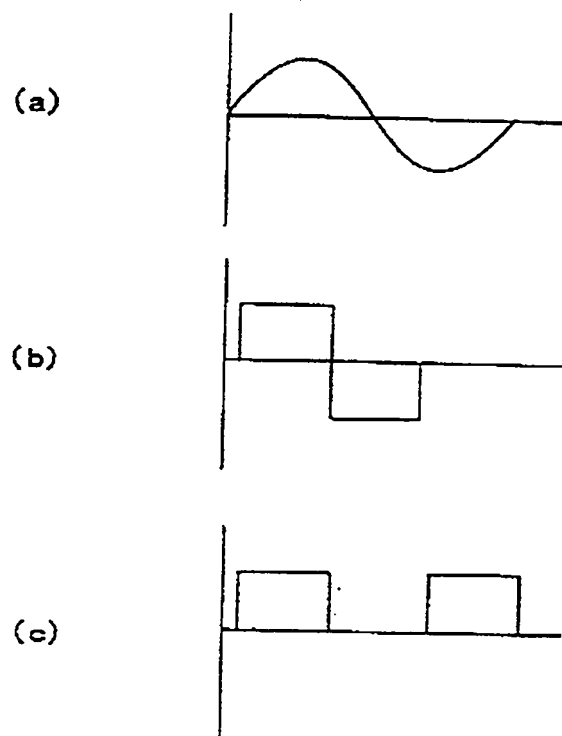


FIG. 35



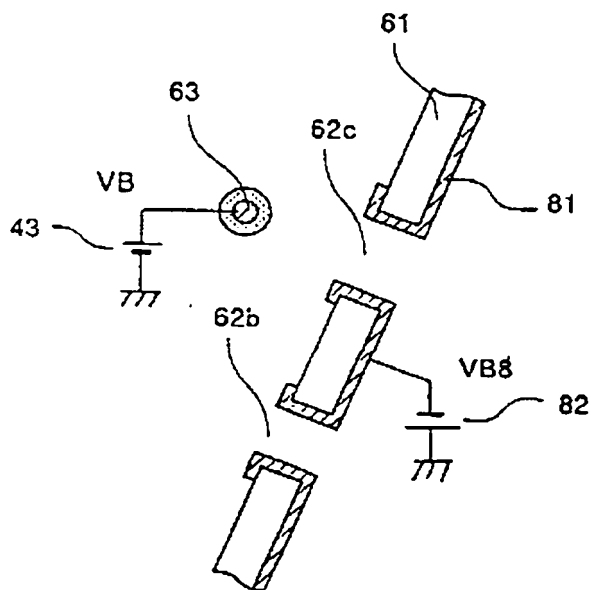


FIG. 38

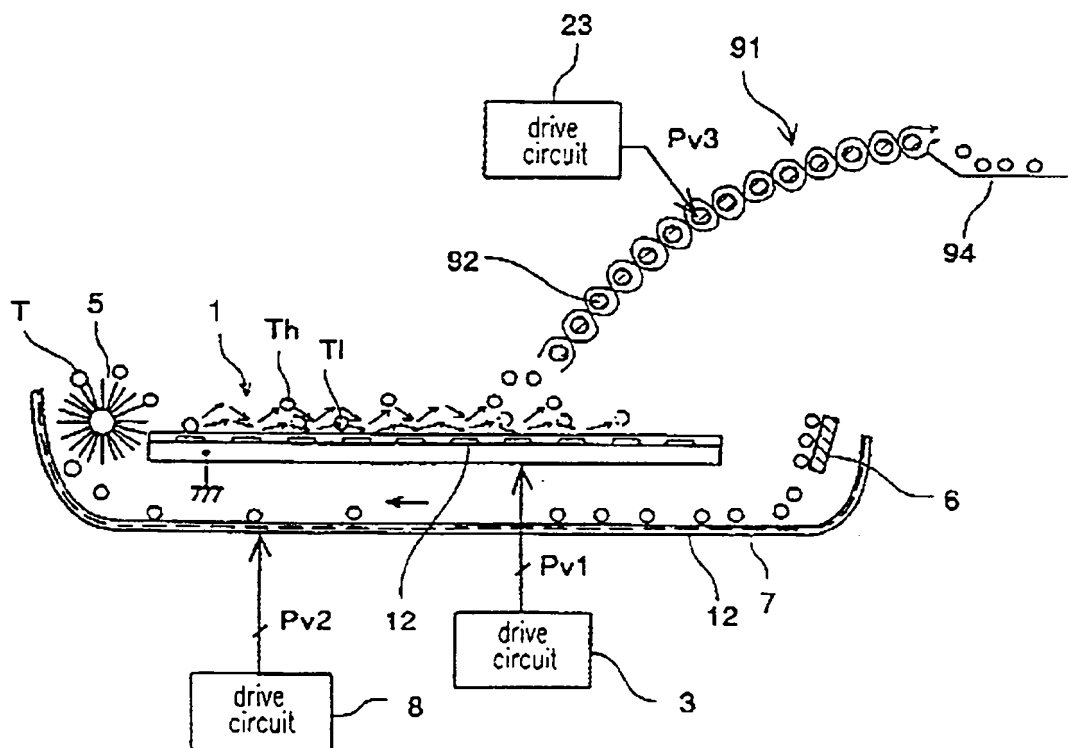


FIG. 39

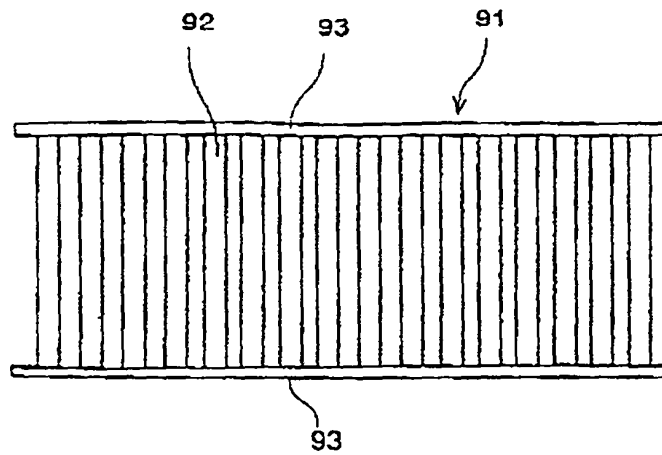


FIG. 40

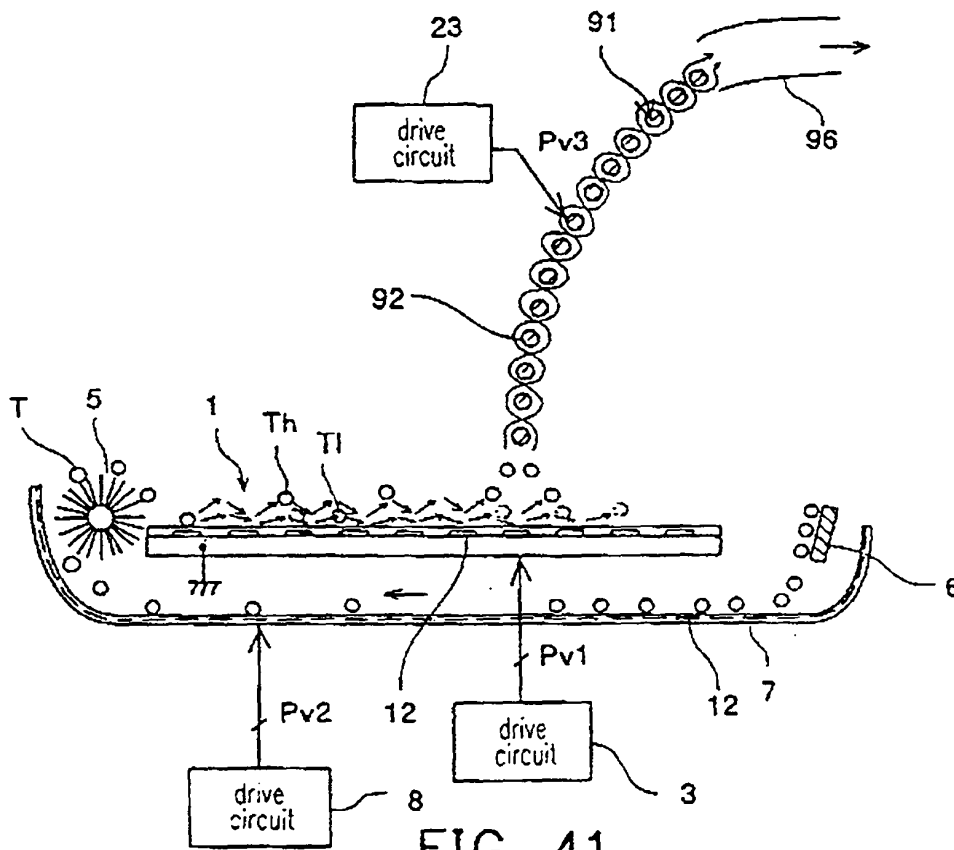


FIG. 41

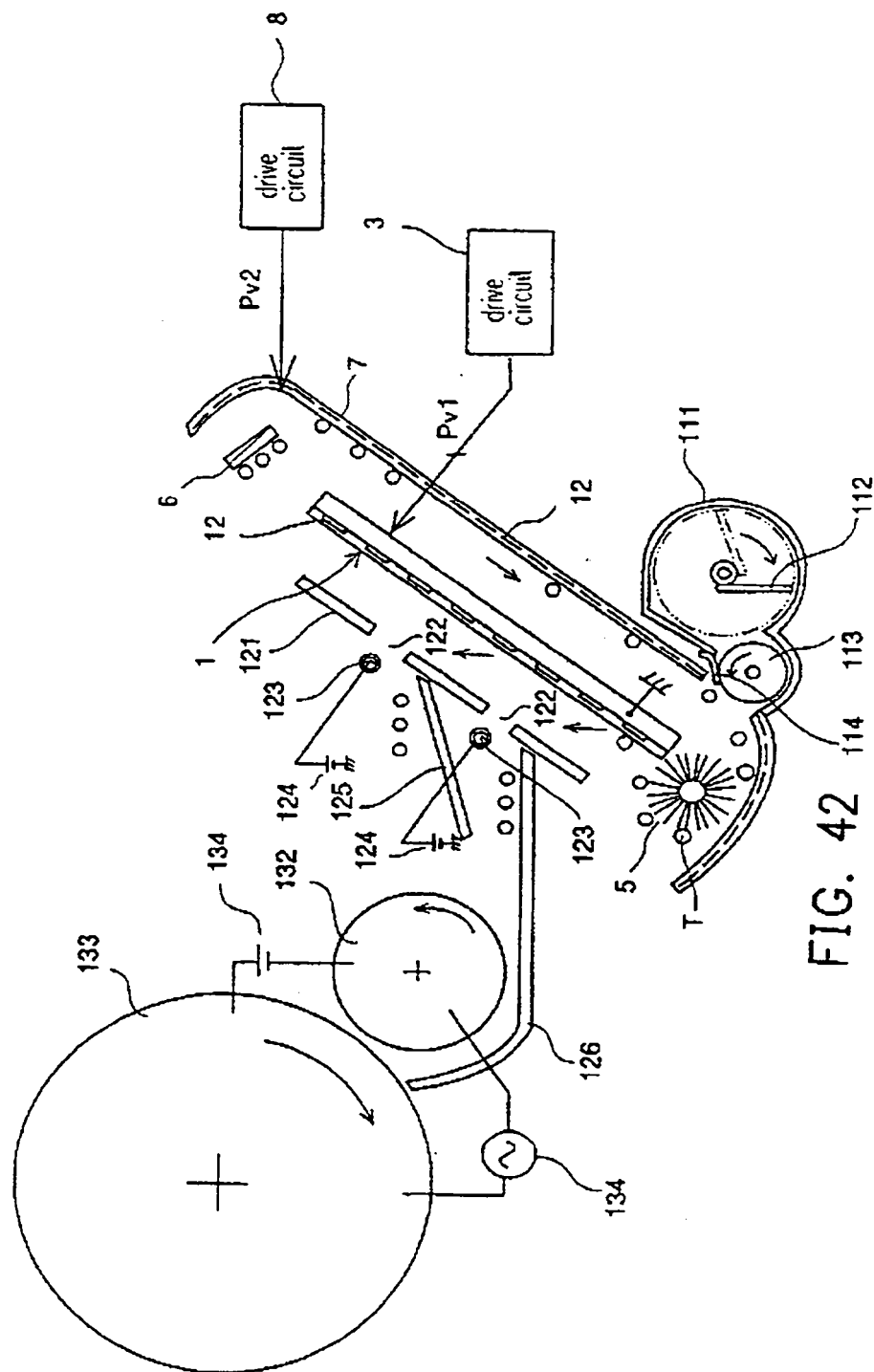


FIG. 42

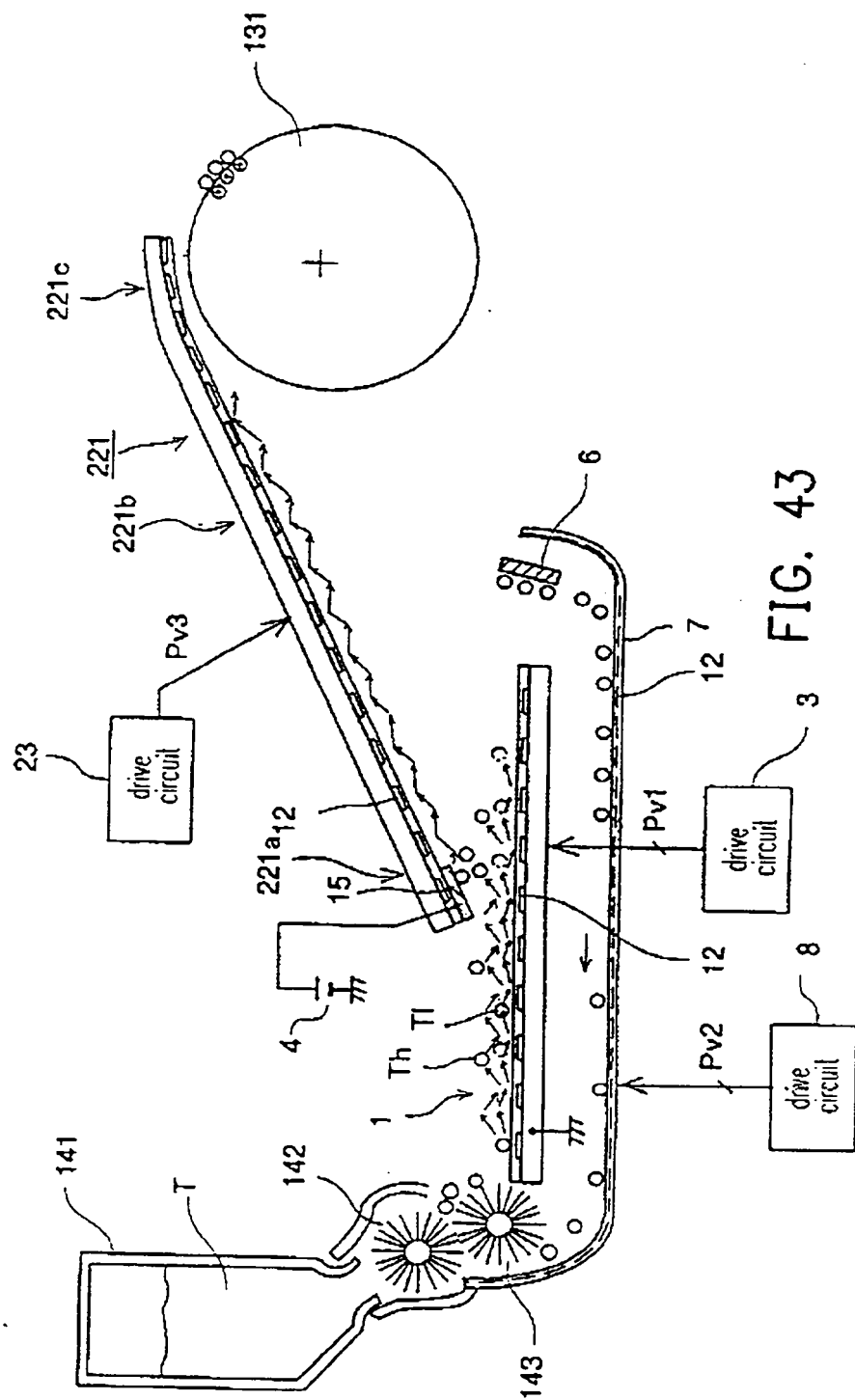


FIG. 43

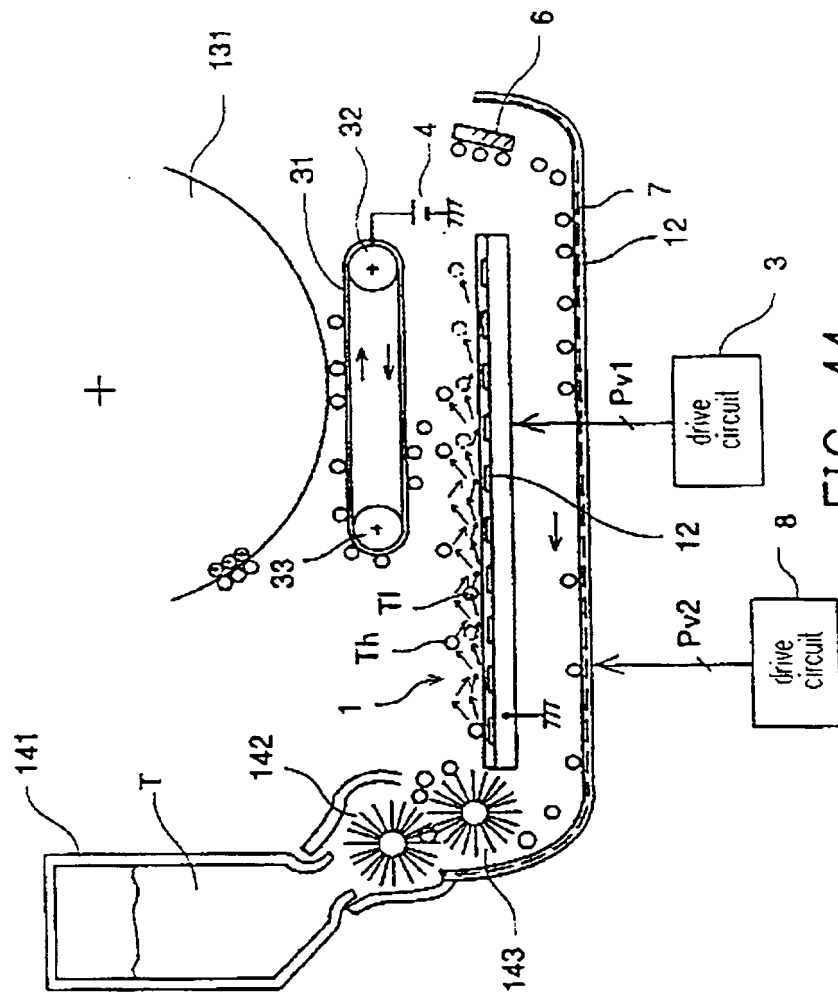


FIG. 44

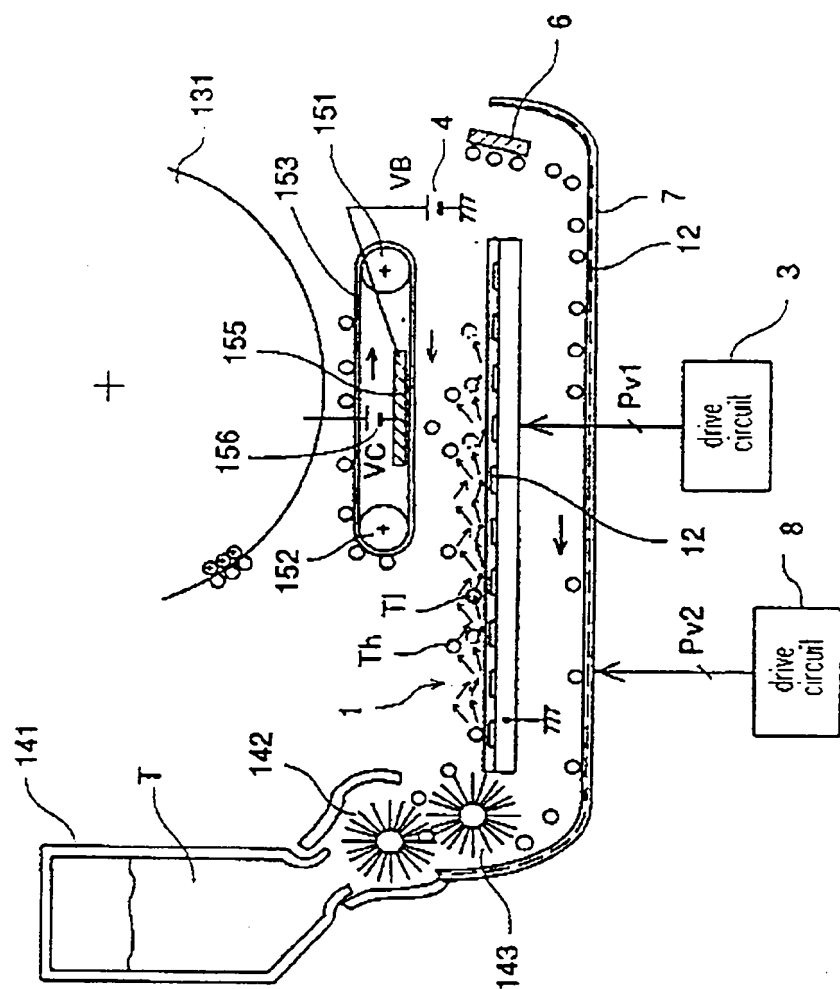


FIG. 45

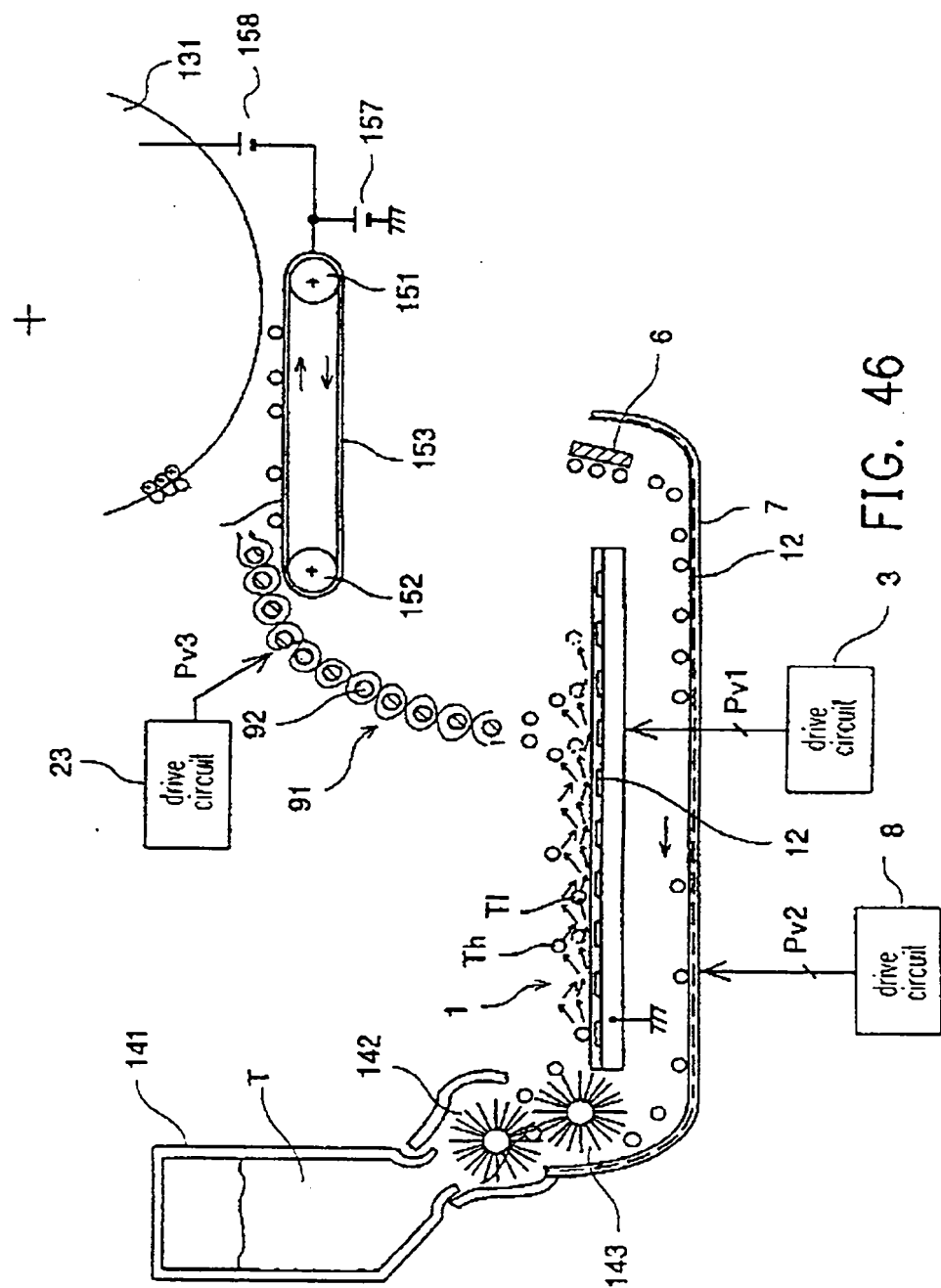


FIG. 46

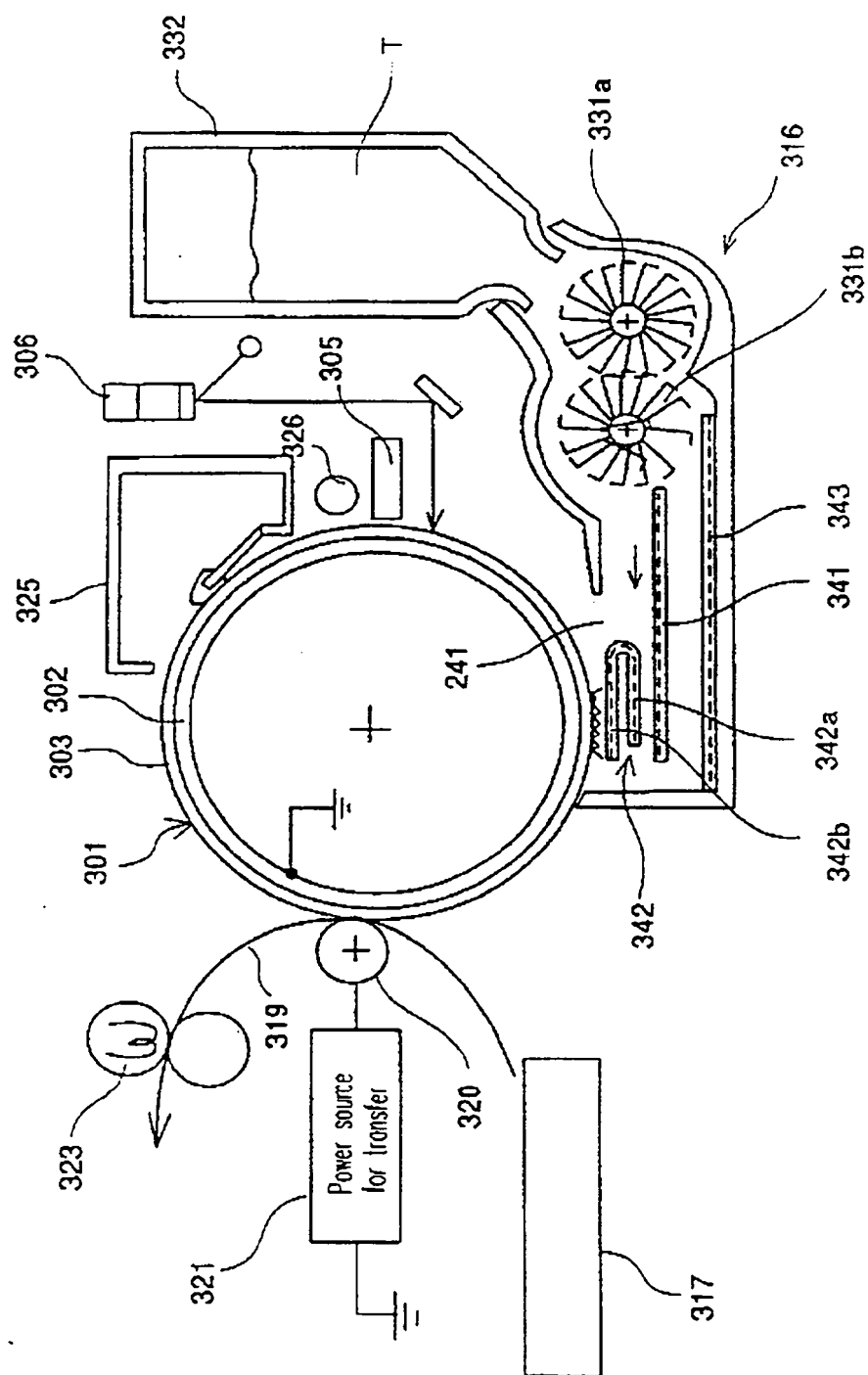
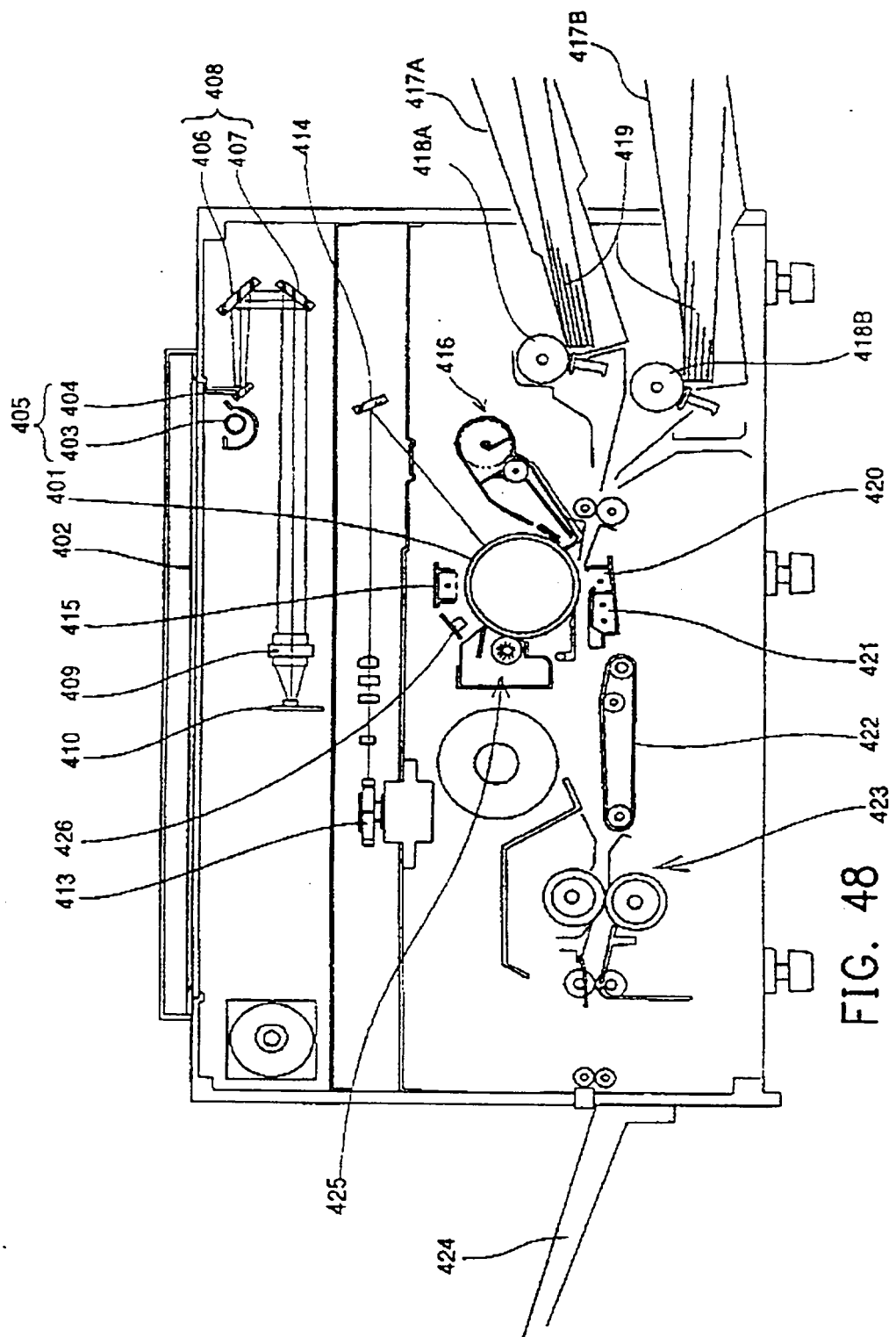


FIG. 47



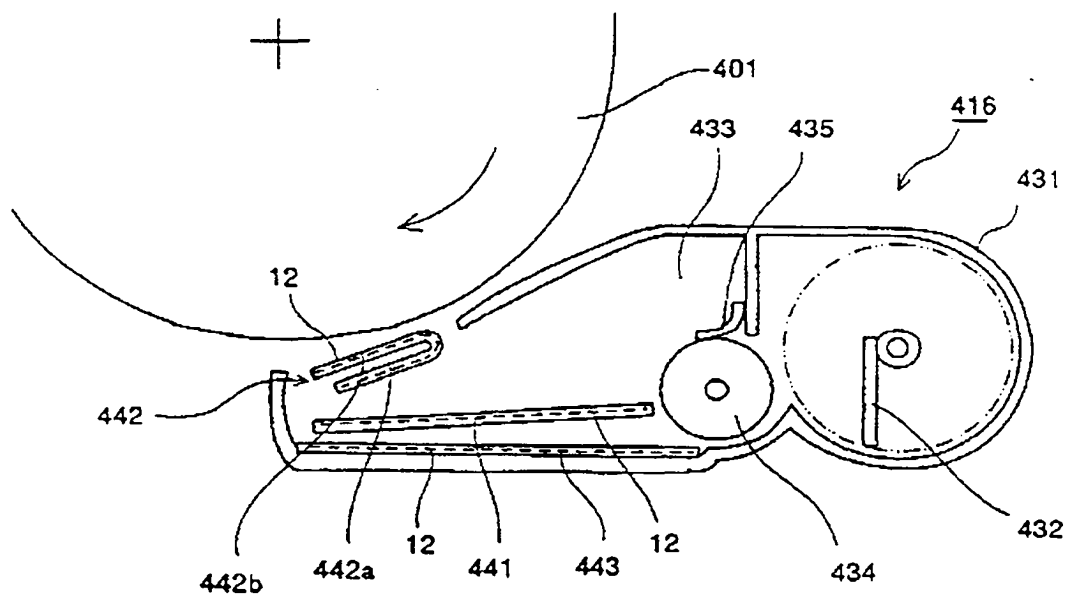


FIG. 49

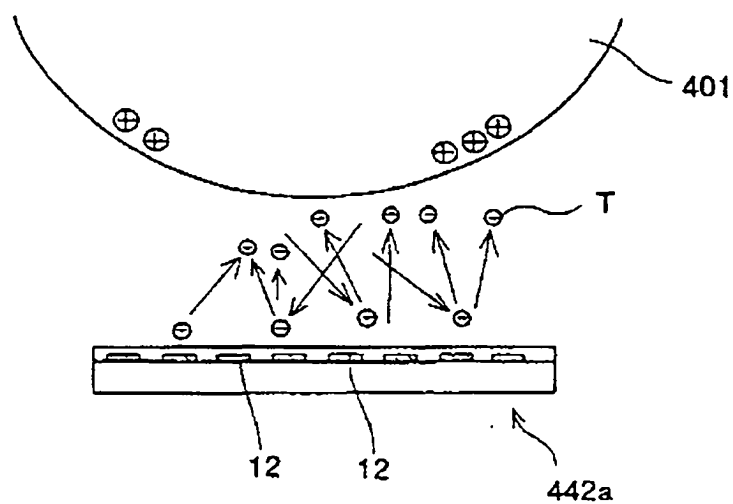


FIG. 50

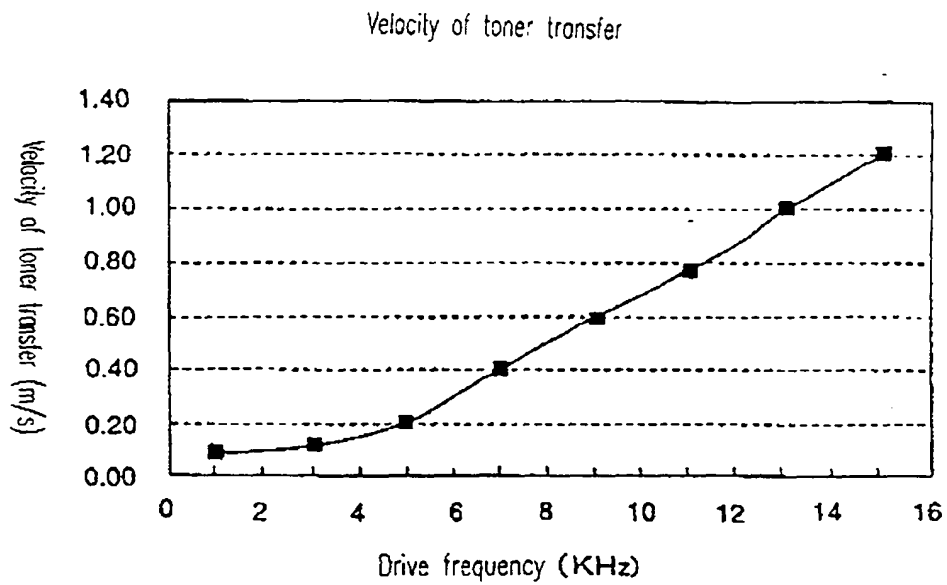


FIG. 51

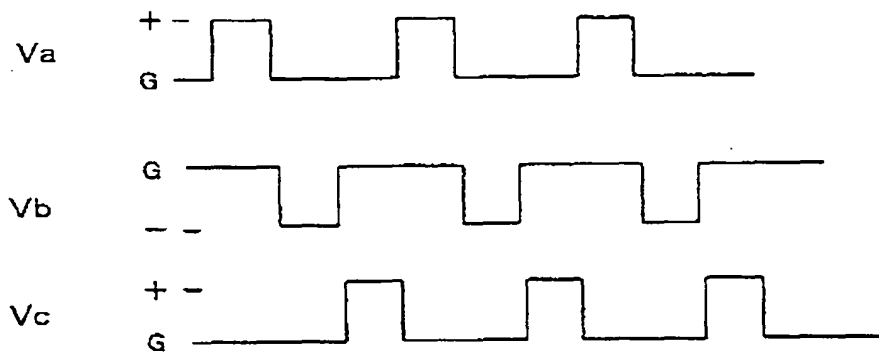
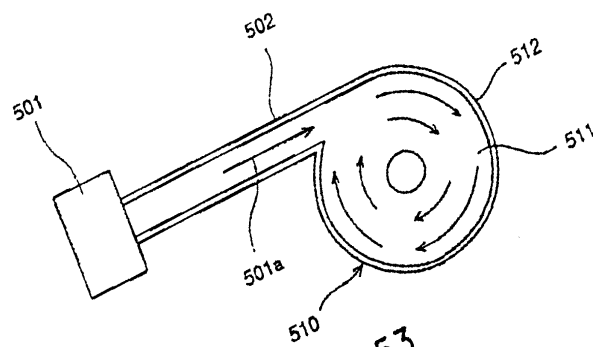


FIG. 52



510
FIG. 53
523

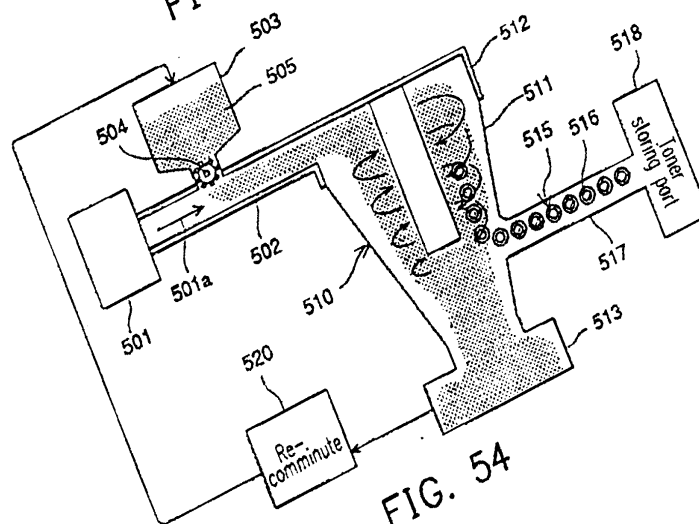


FIG. 54